DIV. OF FISHES

COMMERCIAL FISHERIES Review

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COVER: Object being lowered is a "door"; a second door is on other side of vessel. They will be attached to a trawl, already in water, to keep its "mouth" open. Water pushing against doors keeps them in desired position--and trawl open.

BCF's research vessel "Silver Bay" was conducting bottomfish explorations off South Carolina in winter. (Photo: J. B. Rivers).

COMMERCIAL FISHERIES

Review

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.

FISHERMEN'S MEMORIAL - GLOUCESTER, MASS.

Managing Editor: Edward Edelsberg

Production Manager
and Associate Editor: Jean Zalevsky

Production: Alma Greene (Senior Compositor),
Mary Andrews and Mary Donaldson

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Throughout this book, the initials BCF stand for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1815 North Fort Myer Drive, Room 510, Arlington, Va. 22209.

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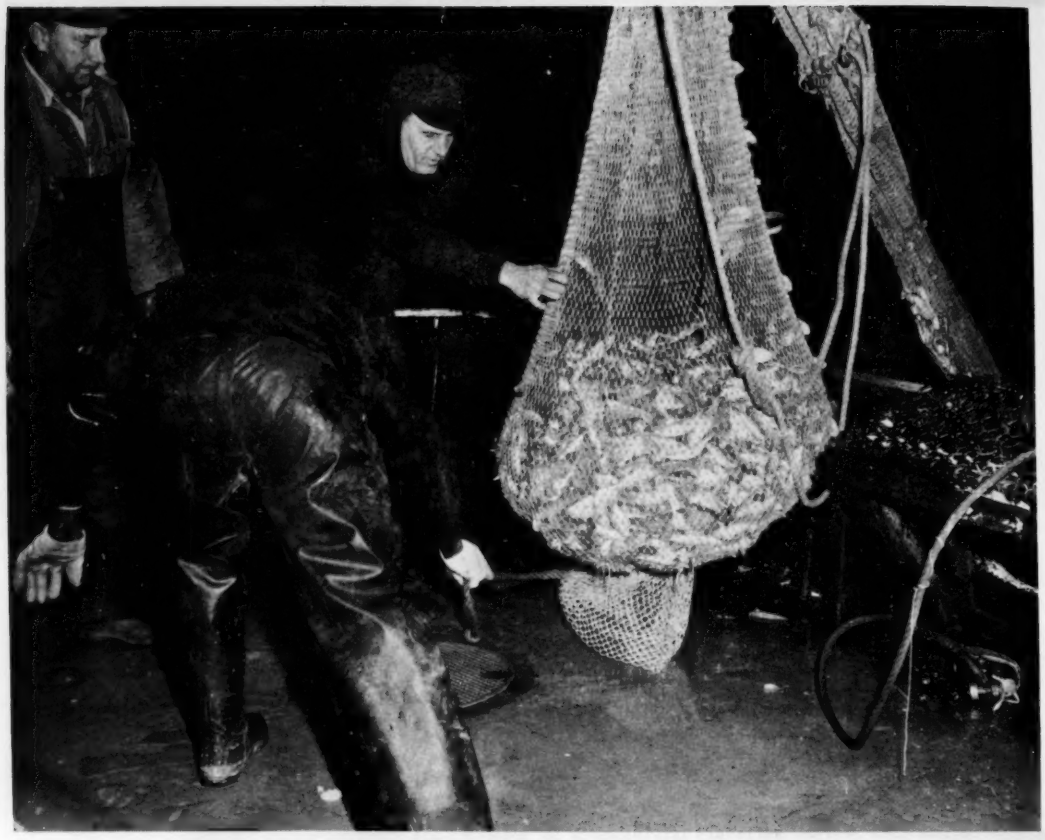


Preparing to "trip the bag" with a catch of brown shrimp during a nighttime exploratory drag by BCF's research vessel "Oregon" off Florida's east coast. (Photo: J. B. Rivers)

U. S. SHRIMP LANDINGS MAY SET RECORD

Available data, principally for the first 9 months of 1967, indicate that the U. S. shrimp catch will set a record this year: at least 285 million pounds, heads-on. This will exceed 1954's record landings of 268 million pounds.

Although the monthly catch can, and does, fluctuate widely from season to season, the 1967 estimate assumes that landings at ports of the Gulf and South Atlantic States in October through December will approximate the average volume for these 3 months during the past 10 years--and that landings in other states will be slightly higher than in 1966.

The catch in southern states during January-September totaled 187 million pounds, up 47 million from the same period in 1966. Available information indicates the combined catch from the Pacific and North Atlantic Oceans, landed principally in Alaska and Maine, is above comparable periods in 1966.

Abundant in N. Gulf of Mexico

The upward trend in the catch this year resulted from an abundant supply of shrimp in the northern Gulf of Mexico--in waters off Texas and Louisiana. Landings were heavy in the summer months, height of the brown shrimp season. Compared with 1966, there were significant increases in the catch each month beginning with May and ending with August. September landings also increased. But, in mid-September, Hurricane Beulah paralyzed fishing operations and did extensive damage to many vessels (some were destroyed) and shore establishments. The hurricane reduced the fleet for the remainder of the year. Major damage centered in the Pt. Isabel-Brownsville, Texas, area, an important shrimp production center, but a wide area was affected.

Small Size in May-June

Much of the Gulf coast catch was small in size, particularly during May and June, and canning plants and, to a lesser extent, sun-drying shrimp platforms utilized appreciable quantities. However, the bulk of the catch so far this year was destined for the fresh and frozen trade, primarily as frozen headless shrimp, frozen raw meat, frozen breaded, and frozen cooked meat.

During the period of heavy landings, canning plants operated at full capacity. In January-September, Gulf canning plants received 38 million pounds for processing; nearly 70 percent of this quantity was canned in a $1\frac{1}{2}$-month period ending with June. Most of the remainder was packed and processed during July and August. Plants used about 24 million pounds for canning in January-September 1966 and 30 million in January-September 1965. (BCF Branch of Fishery Statistics.)

COMMERCIAL FISHING HAS WORLD ROLE, SAYS INTERIOR UNDER SECRETARY BLACK

Under Secretary of the Interior David S. Black spoke at the opening dinner of the Commercial Fish Exposition at Suffolk Downs, Boston, Mass., on October 10. Nearly all of his speech follows:

" . . . This is the first time such a group has gathered in the United States, and it is another fitting first for New England. It was here in New England that the first fisheries in this country sprang up. These waters off our 'stern and rockbound coast' are the cradle of the U. S. fishing industry. It was here, too, that freezing and filleting of fish were first tried. The first steam trawler operated out of New England. The oldest fish auction in this country is Boston's own. The first convenience processing and packaging of fish was New England-based, and New England has industriously maintained its leadership in this very important field. In 1966, the first subsidy vessel--the 88-foot 'Victor'--was delivered to a dock in New Bedford . . . .

"Before we look at the commercial fishing picture, it might be well to consider briefly the framework in which it stands. That setting, if we look at it honestly, can have only one name--worldwide hunger. The music of the spheres is being drowned out by the growls of empty bellies all over the earth, and there is a growing appreciation of the need to mobilize against the menace of mass starvation.

"With the land in many underfed countries already producing at levels of near-maximum yield, it is natural that we turn our attention to the sea. As population pressures mount in these countries, they are being backed up against the oceans. We can count ourselves uncommonly blessed that the oceans are so full of food."

World Interest in Food From Sea

"I am happy to report that there is a healthy range to the worldwide interest in food from the sea. The resurgence of U. S. interest in the ocean and its riches comes from the top echelons of government, and from education as well as from industry. Vice President Humphrey is chairman of the National Council on Marine Resources and Engineering Development and in this capacity he has visited several of our Bureau of Commercial Fisheries' scientific installations. Secretary Udall will be making a presentation before the National Council next week of a project to make fish protein concentrate a really significant weapon in the war on world famine.

David S. Black

"Universities everywhere are expanding the teaching of oceanography and the various scientific disciplines it includes, and eager young men and women are responding to this modern version of the age-old challenge of the seas.

"And industry is getting the signals. Manufacturers, large and small, are coming up with more and more effective and sophisticated gear for oceanographic work."

The Seas' Food Potential

"The prospect of the seas has always aroused man's sense of excitement and adventure. Something in the pulsing state of restless change and the limitless nature of oceans has set a mysterious seal of promise on them. Today we know a little, and are determined to know more, about what that promise holds, and industry is helping us tool up for the search. The results hold vast promise of being well worth the effort. Experts vary in their assessments of the food potential of the seas, but we do know that the present world marine catch is approximately 52 million metric tons per year. At the Law of the Sea Institute meetings at the University of Rhode Island in June, experts presented exciting

estimates of potentials ranging from 200 million to 4 billion metric tons, or nearly 100 times the present world catch.

"The lowest of these estimates--or 200 million metric tons--would provide about 20 grams of animal protein per day for 5 billion people. Of the 60 grams of total protein required daily per individual, 10 grams is the minimum that should be animal protein."

"Wild Catch" and Fish Farming

"Obviously, the answer to world hunger lies at least partially in the world's oceans. And when we talk of potential today, we are still talking in terms of 'wild catch.' The richness and ease of harvest offered by the oceans and estuaries today put any consideration of future fish farming into somewhat the same category as desalination. We have the know-how to produce fresh, potable water in quantities and at a cost that makes it a real bargain already in some parts of the world and a reliable cushion for future water-hard times. In much the same way we may view the prospect of fish farming. There is no doubt about the feasibility of producing shellfish and some finfish by marine farming and freshwater pond culture--indeed, some choice species in demand on the high-priced market, such as oysters and catfish, are already being cultivated in just this way. But until we have taken every technological and industrial advantage of the wild water harvest, such methods will not claim top attention or energy in the over-all commercial fishery picture.

"Instead, we look today for new ways of increasing the yield of our commercial fishing fleets. Other countries have been faster than the United States in taking advantage of the vast food potential of the seas. In a way, we Americans are paying today for the victory we achieved in World War II. We came out of that conflict with a comparatively intact fleet of ships. Other nations had to start from scratch and rebuild, and as a result, their floating stock is newer and far superior to ours today.

"But aside from this, the performance of U. S. commercial fisheries still lags far behind the achievement potential that research and development have opened up. In this respect, our ocean 'farmers' could take a page from the book of their landed counterparts. Agricultural technology has been adopted with enthusiasm and vigor by the farming industry, and the results speak for themselves in the statistical language of food production."

Small Fishes Can Make Large Contribution

"There are many ways of approaching the food potential of the oceans, but size is a handy separator, and Dr. W. M. Chapman's breakdown of fish into three size categories is helpful in pointing up some of the avenues of development that beckon today.

"While world hunger is a universal chorus, the tune is not the same everywhere. Rising incomes in some parts of the world are reflected in a demand for higher-priced products and these are generally the products that fall into the upper size category--over 10 inches. The high-income nations demand most of their fish (with the exception of shellfish) in this category, and are willing and able to pay for particular flavor, texture and appearance.

"In the middle size category--5 to 10 inches long--fall the herring-like fishes, and these form the major part of the world catch. The greatest volume of protein in the ocean, however, is in animals less than 5 inches long, and it is in these last two groups that the hope for substantial help for the underfed two-thirds of the world lies.

"The possibilities--like the potential--are unlimited.

"With millions of tons of ocean protein available, and with the technology to produce it at hand, the most obvious avenue open today is development of new ways to get this protein into acceptable forms of food for human consumption."

FPC

"Fish protein concentrate is the most exciting and promising of the new ideas in this field. Eventually, if educational methods are successful in introducing it into the diets of the various cultures most in need of it, this method could utilize as raw material the marine life in any of the size categories in the sea. Its tasteless, odorless, neutral nature lends itself to the 'additive' role, so that it can be introduced inoffensively into the native dishes of almost any prevailing culture without doing violence either to custom or to taste.

"Another method already widely used is to turn fish into some other form of protein before we turn it into human beings. Peru, with its 8 million ton annual catch of ancho-

vettas, is the world's leading example of this particular method. The anchovettas are easily transformed into fish meal, which in turn is fed to poultry. Just as people who prefer their corn in the form of bacon or ham can indulge their taste preferences on cornfed hog products, so those who prefer poultry to anchovies can get their fish protein by chewing on a chicken leg fattened on fish meal."

Fishing's World Role

"Essentially, what I am asking for here tonight is that you who make your living in and around and off the seas, extend your vision in the same manner that conservationists everywhere have been extending theirs--to accommodate a world view. We human beings are asking so much of our world and of each other today. The questions are not arising from idle curiosity but from urgent need. The earth and air and water cry out for care and consideration, and we human beings, although we have needs of our own, have also a role as custodians. We are the movers and the shakers of the natural world and of the world of human affairs. The overlapping of these two worlds is making it increasingly necessary that we look at everything we do in the light of everything that is being or needs to be done.

"Your greatest role, as I see it, is not just making a living from the sea. It is also providing living for fellow human beings. Once you widen your view to take in this second consideration, your goal becomes higher than a mere plus sign on the profit side of the ledger. And the satisfactions of success come less from an additional eked-out penny than from a sense of performing a necessary and worthwhile role in the total world scene.

"I am building up to a sincere pat on the back to the manufacturers of commercial fishing hardware--the ships, the gear, the increasingly various ways of processing and packaging and distributing the bounty of the sea. And I want to make it clear that my congratulations are not merely on the higher profits that these things mean for everyone in your industry. These higher profits are very real and should act as a spur to greater efforts at modernization, but self-interest in your case involves human profits, too. Research and technology have made it possible for you to profit by enlightened self-interest. You can afford to think of the world's hungry people."

North America Lags

"I am speaking now particularly to the North American representatives of the fishing industry. We in this hemisphere have not carried out a vigorous policy toward increasing the use of high seas fishery resources. Where other nations have intensified their efforts, our own fisheries have remained largely static. With the hunger of the world mounting, the methods of processing ocean products multiplying, the means of making the catch widening and improving, we can no longer justify the cautious creaky old ways that worked well enough once upon a time.

"Ocean specialists have done a yeoman service in charting new and profitable paths for commercial fishermen. Their knowledge has too often been unused--the methods and gear ignored. And as a result, it is not uncommon to find our U. S. industry being fished circles around, in waters it once dominated--indeed, even thought of as 'our own.'

"In great measure, this is failure by default. But the race is not over. The competition is by no means closed. On the contrary, the field is opening wider every day, and the prizes--in both economic and human terms--grow daily in importance.

"President Johnson, last April at Punta del Esta, said: We are also prepared to set up in Latin America a demonstration center in the field of fish protein concentrates. We believe that this essential ingredient of a balanced diet can be provided at a much lower cost than has ever been known in our history.

"A team of men from Interior's Bureau of Commercial Fisheries has just returned from Latin America, and is preparing recommendations as to where such a plan could be located at the lowest cost and the highest benefit to the people of Latin America. The President feels that the first such plant outside the United States should be built where there is the greatest likelihood of rapid success in utilizing the ocean potential in feeding the hungry."

Industry on the Move

"What I see and sense here in Boston tonight is an industry on the move. With seven-tenths of the earth's surface given to oceans, with the tremendous surge forward in methodology and tooling, and with a heightened awareness of hunger and concern for the hungry, the

eyes of the world are on commercial fisheries. And in this case, the eyes are NOT bigger than the stomach. You will find an eager taker for every edible gram of protein you place on the world's table.

"Yours is no longer just a business. It is a world role, and an increasingly vital one. Government and education are deeply interested in helping you fill it successfully.

"The help given your industry by government and education centers is not proferred entirely in your economic interests. It stems from the larger world stake in commercial fisheries. By taking full advantage of all the knowledge and technology available, you serve not just your own interests, but those of an anxious, needy world.

"I congratulate you on your industrial initiative, as evidenced by the enthusiastic participation in this Exposition. And I urge you, as individuals, to take full advantage of the information and resource pool available to you in stepping up your production. In doing so, you are acting as worthy stewards of a huge and priceless resource."

DO FISH HEAR?

Most fish are deaf to general noise at frequencies higher than 1,500 to 2,000 cycles per second (well within human auditory range). Although minnow, sucker, and catfish can detect noise in the 800- to 1,500-c.p.s. range, most other fish cannot. Sounds in the 300- to 800-c.p.s. range are audible to most marine fishes. Noise in the low-frequency range, below 300 c.p.s., is detected through the lateral line system or skin rather than the ear structure.

Noises which most fish probably cannot hear include those made by air bubbles, water currents, fish feeding sounds, and ultrasonic sounds produced by porpoises and whales for purposes of echo-ranging. Noises which they evidently can detect are those produced by waves, the hydrodynamic shock waves produced by fish movements, and the drumming sounds produced by the swim bladder of other fish.

These are the conclusions of a detailed study and review of information on the hearing ability of fishes presented in "Bulletin", volume 126, article 2, of the American Museum of Natural History, New York City. In their study, American Museum biologist William N. Tavolga and Brandeis University (Waltham, Massachusetts) psychologist Jerome Wodinsky employed sophisticated acoustical instruments and training techniques on nine different species of marine fish. The latter included squirrelfish, blue-striped grunt, schoolmaster, red hind, and slender sea robin.

UNITED STATES

Marketing of Edible Fishery Products in 1967

Supplies of edible fishery products in 1967 are expected to total 2.66 billion pounds edible weight, down fractionally from 1966. Landings by U. S. fishermen and imports are down. Per-capita consumption in the U. S., however, still is expected to hold at last year's 10.6 pounds due to the larger-than-usual depletion of year-beginning stocks.

Consumer prices during the fourth quarter of 1967 likely will average a little higher than last year because the reduced supplies of some popular products continue. Supplies of canned salmon, frozen cod fillets, lobster tails, and scallops are down sharply from a year ago. Also, frozen stocks of halibut, swordfish, whiting, and crabs (including crab meat), are below last year's. Frozen holdings of shrimp are ample compared with a year ago. Among other canned products, there are good packs of tuna and shrimp, and a fair pack of Maine sardines.

At the end of 1967, stocks of fishery products are expected to be smaller than at the end of 1966. A reduction of about 3 percent is expected in frozen stocks and of about 22 percent in canned inventories. (BCF Branch of Current Economic Analysis.)

Menhaden Catch Drops in First 9 Months

The catch of menhaden in the U. S. from January through September 1967 was 931.6 million pounds. In the same period of 1966, it had been 1,015.8 million pounds.

States	Jan.-Sept.		Sept.	
	1967	1966	1967	1966
	(Millions of Pounds)			
Middle Atlantic	33.4	17.0	8.8	4.7
Chesapeake	129.6	150.2	16.1	33.3
South Atlantic	75.7	56.7	7.6	11.9
Gulf Coast	692.9	791.9	71.6	113.5
Total	931.6	1,015.8	104.1	163.4

U. S. Fish Meal, Oil, and Solubles Production in September

During September, about 13 million pounds of marine animal oils and 17,164 tons of fish meal were produced in the U. S. Compared with September 1966, this was a decrease of about 7.5 million pounds of marine animal oils and 6,009 tons of fish meal and scrap. Fish solubles production was 6,642 tons--down 3,144 tons from September 1966.

U. S. Production of Fish Meal, Oil, and Solubles, September 1967 1/ with Comparisons

Product	Sept.		Jan.-Sept.		Total
	1/ 1967	1966	1/ 1967	1966	1966
	(Short Tons)				
Fish Meal and Scrap:					
Alewives	2/	-	4,508	3,746	3,746
Groundfish	835	360	6,361	5,189	6,311
Herring	1,286	2,067	7,649	10,172	11,850
Menhaden 3/	11,085	17,233	97,229	107,289	134,954
Tuna and mackerel 4/	2,357	2,010	26,773	22,460	29,758
Unclassified	1,601	1,503	8,796	20,608	24,728
Total	17,164	23,173	151,316	169,464	211,347
Shellfish meal and scrap	5/	1,634	5/	9,259	11,773
Grand total meal and scrap	5/	24,807	5/	178,723	223,120
Fish Solubles:					
Menhaden	4,427	8,461	42,253	51,758	60,769
Unclassified	2,215	1,325	17,795	18,394	22,672
Total	6,642	9,786	60,048	70,152	83,441
	(1,000 Pounds)				
Oil, Body:					
Alewives	2/	2/	1,827	2/	2/
Groundfish	105	9	1,143	457	536
Herring	659	1,248	4,142	6,883	7,862
Menhaden 3/	10,058	18,393	76,801	117,542	144,198
Tuna and mackerel 4/	603	276	4,511	3,315	4,884
Unclassified (including whale)	1,559	532	4,284	5,001	6,565
Total oil	12,984	20,458	92,708	133,198	164,045

1/Preliminary data.
2/Included with unclassified.
3/Includes small quantities of other species.
4/Includes anchovies.
5/Not available on current monthly basis.
Source: U. S. Department of the Interior, BCF.

Columbia River Coho Salmon Run Sets Record

The 1967 Columbia River coho salmon run appears to have broken all records. The commercial troll fishery off the coast of Oregon has harvested an estimated 7.3 million pounds,

an all-time record. The sport catch of coho at the mouth of the Columbia River has exceeded 250,000 fish, a record. The commercial gill net catch in the Columbia River was approximately 280,000 fish. This was down somewhat from last year but still a very high harvest.

Returns of adult coho to hatcheries have been outstanding. They are more than sufficient to fill all egg-taking needs. In addition, the run past Bonneville Dam, as of October 12, totaled 95,031 fish. It is the highest ever recorded at Bonneville for that species.

More Aluminum Used in Vessels

Shipments of aluminum for commercial and naval marine uses increased 90 percent in 1966, according to The Aluminum Association. An estimated 55 million pounds were shipped for use in hulls, engines and components for fishing vessels, barges, cargo ships, passenger liners, naval crew and patrol boats, gun boats, hydrofoils, and other craft. Pleasure boats are not included.

A major project is a 226-foot, all-aluminum, trailer ship, the world's largest ocean-going aluminum-hulled vessel, using nearly 800,000 pounds. ("Under Sea Technology," Sept.)

University of Michigan Studies Electronic Fishing

Michigan University reports that it has demonstrated the feasibility of effective, relatively low cost electronic fishing by which fish are attracted to electrodes placed in the water. The system may be useful in the Great Lakes to control alewives. The electronic fishing study is being done under a research contract from Interior Department's BCF.

The university used a small pond and gold fish to demonstrate the system at the National Electronics Conference at Chicago in October. The system will make use of electrode screens operated from boats to sweep or herd fish toward the mouth of a net or the intake of a fish pump.

Lower Power Supply May Be Effective

A university research engineer said the system, which uses power supplies of 5 to 10 kilowatts, may prove as effective in fresh water as previous methods requiring 50-kw. supplies. He said a composite pulse with a 10-percent duty cycle showed, in the laboratory, that it was just as effective as a solid pulse. The low average power of the composite pulse used is expected to produce less fatigue in fish, he said, while allowing longer range, lower operating costs, and lighter equipment.

Because salt water's high conductivity requires 100 times the power needed for fresh water, the composite pulse is even more important in holding average power to reasonable levels. The engineer pointed out: "Previous electrode arrays often created a strong field which stunned the fish before they got where you wanted them to go."

Such equipment, he continued, had an effective range of only 10 to 20 feet, while the equipment under study is effective up to several hundred feet. "Authorities estimate that two or three times as many fish escape as are caught by conventional nets. Proper electronic fishing can increase the catch by 100 to 200 percent. Further economic savings can be made by combining electronic fishing with the use of fish pumps for emptying trap nets."

Electronic Fishing Is Selective

An advantage of electronic fishing is that it can attract selectively fish of a particular size or type, while leaving out those not desired. Thus, third-year alewives could be caught before they die on the beaches, and a supply of smaller fish could be left to maintain the population and provide food for the coho salmon.

The University of Michigan study should end this year with field studies in the Great Lakes and Tennessee Valley Authority lakes. The project also will involve building prototype commercial power units and making tests in towing tanks and model basins to choose the best array of electrodes. After final tests, the university says, prototype designs should be available to commercial manufacturers by spring 1968.

OCEANOGRAPHY

Sub "Alvin" Loses--Then Finds--Its Famous Arm

The submarine Alvin's mechanical arm--which last year lifted the parachute shrouding the H-bomb that had been dropped accidentally off the Spanish coast--fell into the Atlantic in late September this year 100 miles off Woods Hole, Mass., on the continental slope.

The research submarine of the Woods Hole Oceanographic Institution had been engaged in studies of the sea bottom. When the weather became extremely heavy, its mother ship began to recover it. While this was being done, the famous arm--500 pounds and extending to 8 feet--fell to the ocean floor in 4,400 feet of water.

When the arm fell, the sub's catamaran tender and the research vessel "Gosnold" fixed their positions with Loran A. This enabled the tender to return later to take part in the search.

New Recovery Techniques Used

A transponder was placed on the bottom, which provided the sub's pilots with a range and bearing from a fixed point to conduct the search operations. Then beacons or pingers were placed in several locations as reference points for the search pattern. The sonar was used to map the terrain. Once the sonar's effectiveness was learned, individual objects were picked up and a grid pattern laid out for search.

The search area was 2 miles long and one mile wide--"gentle rolling hills with a soft layer of sediment." Accurate and continuous plots of the submarine's location were obtained with the aid of the transponder and

Fig. 1 - The sea on day Alvin lost its arm. (Photos: Woods Hole Oceanographic Institute.)

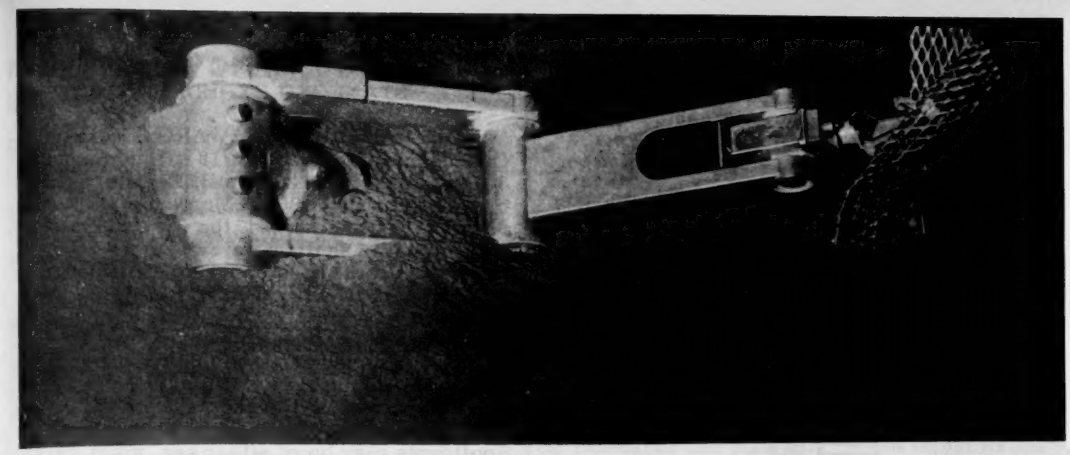


Fig. 2 - The fallen arm at 4,400 feet.

beacons. After the outstanding features of the ocean floor were obtained, the sonar was used to find metal objects for visual identification. Consistent sonar contacts were obtained with objects such as gallon cans and frequent contacts were made with objects the size of half-gallon cans.

On the third dive, the mechanical arm was located and recovered. The recovery was made by inserting a hook, fastened to the sub's bow, through the mechanical arm. The trim and ballast within the sub were then changed to permit it to surface normally with the arm on the hook. When the sub surfaced, swimmers attached lines to the arm and it was lifted aboard the catamaran.

Then, with its arm rejoined, the Alvin again changed the ballast and trim and dove to the bottom to complete its scientific work.

U. S. Tests Sea Bottom's Ability to Support Structures

The U. S. is testing the sea bottom with new instruments designed to determine the sea floor's ability to support structures. The tests are important in a long-range program that may lead to construction of habitations and to engineering activities.

The tests were conducted at 885 feet in the Wilkinson Basin, about 60 miles east of Boston in the Gulf of Maine, by the Environmental Science Services Administration (ESSA) of the U. S. Department of Commerce, and the University of Illinois Department of Geology. ESSA's hydrographic survey ship "Davidson" was used.

Instruments were developed capable of measuring the mass physical properties of ocean sediments directly in the sea floor down to 10 feet below sea bottom.

Inspect Hawaiian Navigational Facilities

The U. S. Coast and Geodetic Survey's (CGS's) new ship "McArthur" is making a complete inspection of navigational facilities and conditions in the Hawaiian Islands. It is the first check of this scope in almost 20 years. Oahu, Hawaii, and Kauai have been covered and the remainder--Maui, Kahoolawe, Lanai, Molokai, and Niihau--is scheduled to be finished by year end. The inspectors consult local Federal agencies, port authorities, pilots, and other marine interests.

The findings for the Hawaiian Islands will be included in a new edition of "United States Coast Pilot 7," with similar information being gathered in California, Oregon, and Washington.

The Coast Pilots are a series of nautical books issued by CGS. The books supply

information important to navigators of U. S. coastal and intracoastal waters. "Generally, the books furnish in narrative form information which can not be shown graphically on marine charts, such as navigation regulations, weather, ice, freshets, routes, and port facilities."

A new edition of each Coast Pilot is published at intervals of 4 to 10 years. The new edition of United States Coast Pilot 7 is scheduled for September 1968. The books contain information considered vital for safe navigation. They are consulted regularly by skippers of naval and commercial craft and small-boat operators.

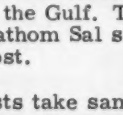
USC Studies California Gulf's Deep Basins

The research vessel "Velero IV" of the University of Southern California (USC) is conducting the first examination since 1889 of benthic (sea bottom) animals in the deep basins of the Gulf of California. The operation will continue into December.

Small samplings were made in the basins 77 years ago by the "Albatross." USC says that nothing significant has been published on the basins' bottom animals since 1919, when the American biologist Chamberlin, who had been aboard the Albatross, published his findings.

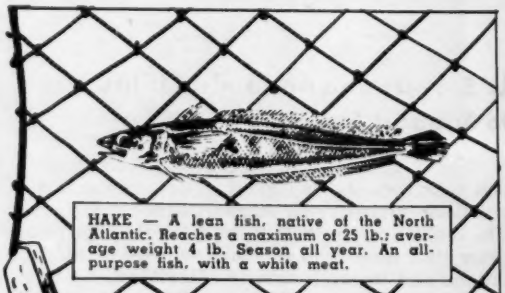
USC scientists will use both midwater trawling equipment and a 900-pound "grab" (resembles an excavating shovel) to study 6 basins ranging from 800 to 2,200 fathoms. The deepest, the Tres Marias Basin, is near the upper end of the Central American trench and just inside the Gulf. The others lie north of it; the 800-fathom Sal si Puedes Basin is the northernmost.

The scientists take samplings from depths where there is no light and where temperatures average about two degrees centigrade. They will probe distribution of fish, crustaceans, and polychaeta worms.



STANFORD EXPEDITION

"OCEANOGRAPHIC AWARDS: Stanford Oceanographic Expedition 18 will commence 3 April 1968 from Guayaquil, Ecuador, and terminate 16 June 1968 at Monterey, California. During this period, the RV TE VEGA will study the shallow water benthos along the coast of the Eastern Tropical Pacific from northern Peru to southern Mexico. Intensive ecological and physiological studies will be conducted in selected areas and related to the geographic distribution of particular marine organisms. Applications for this Expedition will be accepted until 1 Jan. 1968, and advance inquires are encouraged. Applicants may be of either sex, must be research-oriented graduate students or 'young professionals' in biology, should be in good academic standing, and in excellent physical and emotional health. The Expedition represents an extensive 15-unit graduate-level course in Biological Oceanography given at sea by a faculty of three (Drs. Donald Abbott, Stanford University; William Evans, University of Alberta; Richard Bovbjerg, University of Iowa). Ten NSF Awards covering subsistence, full tuition, and transportation to and from the vessel are available. Contact Malvern Gilmartin, Hopkins Marine Station, Pacific Grove, Calif. 93950, for further information."



HAKE — A lean fish, native of the North Atlantic. Reaches a maximum of 25 lb.; average weight 4 lb. Season all year. An all-purpose fish, with a white meat.

Foreign Fishing Off U. S. Coasts in September

IN NORTHWEST ATLANTIC

Soviet: Weekly sightings show that between 45 and 50 Soviet vessels fished on Georges Bank throughout September; a year earlier, about 65.

During the month, 63 individual Soviet vessels were identified: 16 factory stern trawlers, 12 medium refrigerated side trawlers, 29 medium side trawlers, 2 refrigerated fish transports, 1 factoryship, 1 tanker, and one repair tug.

Although scattered, the fleet generally was concentrated in 2 main groups: (1) Between 10 and 15 vessels (stern trawlers and side trawlers) fished along the 50-fathom edge of Cultivator Shoals (80 to 90 miles east of Cape Cod). Moderate catches of fish on deck appeared to be primarily whiting and herring. Some haddock catches were noted, particularly on side trawlers. (2) Between 30 and 35 vessels (mostly side trawlers and several support vessels) were dispersed along northern slopes and inner shoals of Georges Bank working in 25 to 35 fathoms. Large catches of herring filled the open storage areas on decks. This area was fished extensively during September and October 1966 and accounted for substantial increase in their herring catch from ICNAF sub-area 5 (117,346 metric tons) over their limited 1965 catch (36,300 tons).

Poland: Ten freezer stern trawlers, 26 large side trawlers, and two supply vessels were observed fishing among Soviet fleets on Georges Bank in September. Tremendous catches of herring were observed on deck and in trawl nets. Several trawls hauled more than an estimated 50,000 pounds of fish per haul. Open storage areas of large side trawlers were so full of fish that crewmen temporarily had trouble handling them. Only 3 to 5 stern trawlers fished herring on Georges Bank during September and October 1966.

East Germany: 11 freezer stern trawlers were sighted on Georges Bank among Soviet and Polish vessels with huge catches of herring. They fished intermittently during late August, apparently searching for herring. Two stern trawlers operated there during September and October 1966.

West Germany: 4 freezer stern trawlers were sighted on Georges Bank with large catches of herring.

IN THE GULF OF MEXICO

Soviet: No fishing vessels were sighted near U. S. coasts in September. Several were passing to and from Cuban ports and South American Atlantic fishing grounds. Periodic fishing off the Bahama Islands was reported.

Cuban: No vessel was sighted in September near U. S. coasts. It appears that a part of the fleet, observed off Louisiana in July and early August 1967, moved south to Campeche Banks and into southwestern Caribbean Sea off Honduras and Panama. Some might have been on their way to tuna fisheries in central eastern Pacific.

OFF CALIFORNIA

Soviet: The number of vessels decreased in September. In mid-month, a group of 5 large stern factory trawlers were sighted in general area off San Francisco. Four were fishing. The 5th was heading north, presumably returning home. During rest of month, only one stern trawler was sighted off California (north of Farrallon Islands) on September 24. No information is available on species breakdown of catches.

OFF PACIFIC NORTHWEST

Japanese: About 7 stern trawlers, accompanied by 1 tanker, were reported during September. They were fishing ocean perch but reportedly not very successfully. By month's end, only 2 remained.

On 3 occasions, vessels were sighted fishing in closed areas under the U. S.-USSR agreement on fishing in the U. S. contiguous zone. The Japanese had indicated they would also respect these zones. It is known that a condition of the license granted the vessels by the Japanese government was that they avoid these areas.

Three trawlers were refueled by a trawler in the straits of Juan de Fuca in early September by permission of the U. S. Coast Guard because of stormy conditions. On the same day, a large freezer trawler entered Seattle for repair. She left after 24 hours.

Soviet Vessels Fishing Off Pacific Northwest in September 1967						
Week Ending	Area	Medium Side Trawlers	Stern Factory Trawlers	Support Vessels	Research Vessels	Total
		(Number)				
Sept. 7	Wash.	7	8	5	2	22
	Oregon	17	-	8	-	25
Total		24	8	13	2	47
Sept. 14	Wash.	5	6	4	3	18
	Oregon	23	5	13	1	42
Total		28	11	17	4	60
Sept. 21	Wash. Oregon	(The coast was fogged but there probably were the same number of vessels as sighted the previous week.)				
Sept. 28	Wash.	-	5	2	1	8
	Oregon	22	15	9	3	49
Total		22	20	11	4	57

Soviet: The number of fishing and support vessels off Washington and Oregon fluctuated from 50 to 60. Early in September, the fleet was about equally divided between the two areas; towards month's end, the concentration off Oregon was much greater (table).

Most fishing vessels were medium side trawler type at beginning of the month but, by month's end, there were about as many large stern factory trawlers as medium trawlers. The stern trawlers (average catch about 6 times the smaller medium trawlers) were moving south throughout the month; in last week, 15 fished off Oregon and only 5 off Washington.

The number of support vessels (refrigerated carriers and processing factoryships) also fluctuated, presumably with number of vessels and quantity of fish. The highest number was seen during week ending September 14. Resource Management Agents of U. S. Bureau of Commercial Fisheries, with U. S. Coast Guard, on a weekly surveillance flight over Soviet fleets observed that in that week Soviet fishing for Pacific hake was excellent. They observed one single haul by 2 Soviet medium trawlers fishing with a pair trawl yield an estimated 100,000 pounds. This was one of the largest hauls ever observed. It indicates that Soviets have mastered pair trawling, which they began using in Northeastern Pacific in 1966.

Soviet catches were not as good throughout month. In first week, as well as in third and fourth, hauls averaging about 10,000 pounds each were observed; on some occasions, blank or water hauls also were made. Fishing was concentrated on Heceta and Stonewall Banks off Oregon.

From 2 to 4 fishery research and exploratory vessels also supported the fleets. They cruised off Pacific Northwest in search of fish concentrations and alerted fleet when they found new ones. The fleet fished until schools dispersed or fishing tapered off, then moved to a new area. But 1 or 2 exploratory vessels remained to check for reschooling of fish.

There were fewer Soviet fishing vessels off Pacific Northwest in September 1967 than in September 1966, when all fishing and support vessels were medium side trawlers; in September 1967, only about 2 of 3 were medium trawlers. This accords with general growth of Soviet fleets: more and more large stern factory trawlers are replacing smaller medium side trawlers, especially on distant fishing grounds.

OFF ALASKA

Japanese: The number of vessels decreased from 175 early in September to about 150 at month's end. This resulted from termination of king crab fishery in eastern Bering Sea and a decrease in effort along Aleutians.

In the Gulf of Alaska Pacific ocean perch fishery, there were about 14 vessels through the month. Active in the eastern Gulf were 5 factory trawlers off southeastern Alaska and one on Yakutat grounds. The others were in central Gulf. During first-half September, 3 factory trawlers fished on Portlock Bank, 3 on Albatross Bank, and 1 near Chirikof Island. By month's end, all but one were centered on Albatross Bank; the one remained on Portlock Bank.

In early September, about 13 factory trawlers fished for perch along Aleutians. One vessel was located south of eastern Aleutians, 5 south of central Aleutians, and 7 along western Aleutians. As month progressed, number of vessels declined; at month's end, one trawler remained south of Seguam Island in central Aleutians, and 4 trawlers continued fishing along western Aleutians south of Near Islands.

Two trawlers fished for perch along 100-fathom curve in eastern Bering Sea during first week of September and then stopped. Late in month, 3 new 300-gross-ton factory trawlers appeared.

Soviet: Vessels off Alaska decreased from about 43 in early September to about 25 by month's end. The end of whaling off Alaska was principal reason for decrease.

Pacific ocean perch, particularly along Aleutians, was principal species sought.

In Gulf of Alaska, only 1-2 trawlers fished for perch, first on Yakutat grounds and later off southeastern Alaska.

The number of trawlers fishing for perch south of Fox Islands in eastern Aleutians increased from 3 to 8 during month. About mid-month, 5 medium side freezer trawlers began fishing north of Fox Islands. The effort in Seguam and Amukta Islands area in central Aleutians decreased from 4 to 2 trawlers, while 2 trawlers fishing north of Adak Island ended operations about mid-month. Three large stern trawlers and one medium trawler fished for perch along western Aleutians throughout month.

West of Pribilofs, 2 Soviet trawlers fished for perch along 100-fathom curve only in early September.

One whaling fleet was reported along central Aleutians during first-half September. A second fleet also might have operated along Aleutians in early September. By mid-month, the whalers had departed Alaskan area.

SOUND WAVES USED TO MAP OCEAN FLOOR

A side-looking sonar (SLS) can be used to produce quickly detailed and accurate maps of coastal shelves, lake bottoms, harbors, and rivers. It may become as important in charting the ocean floor as aerial photography is for mapping the land.

SLS scans the ocean floor much as a slanted beam of light sidelights the landscape. Pulsed, high-frequency sound waves are sent out by a transmitter housed either in a research vessel or in a "fish" towed behind. The pulses are aimed at the ocean floor a few degrees below the horizontal in a direction perpendicular to the ship's course. As sound hits the bottom, it is reflected in a visual pattern that describes the contours--hills, channels, plateaus--and can be used as a map. Routes for pipelines or shipping channels may be plotted from these data. However, SLS cannot produce three-dimensional images that are mathematically possible but not technically practical at this time. (Reprinted, with permission from Science News, weekly summary of current science, copyrighted 1966 by Science Service, Inc.)

STATES

Alaska

FISHERIES DEVELOPMENT PLANNED

BCF Juneau reports that Gov. Walter J. Hickel of Alaska told foreign newspapermen in Juneau on August 26 that Japanese interests have invested about $125 million in the State since 1958: $60 million in the lumber and pulp industry; $40 million in the petroleum industry, and $25 million in the fishing industry.

There are at least 5 joint Japanese-American fishery operations in Alaska, 4 of them major:

1. The Orca Cannery in Prince William Sound and all Alaska properties of Pacific Alaska Fisheries purchased jointly by Mitsubishi Shoji, the largest corporate complex in Japan; Nichiro Gyogyo, the world's largest salmon canning company; and New England Fish Company.

2. The Sand Point Packing Co., of Sand Point, formed by the same 3 companies.

3. B. & B. Fisheries Inc., Kodiak Island, jointly formed on a 50-50 basis by Taiyo Fishing Co. of Japan, one of the world's largest fishing companies, and Bix Bonney.

4. Seward Fish Freezing Co., 49 percent Japanese owned, bought jointly by Hoko Suisan, a fishery firm; Marubeni Iida, a trading firm; and the U. S. firm TAD Fishing Co.

Governor Visits Japan

Returning from a 10-day visit to Japan in September, Hickel reported concluding an informal agreement with Taiyo Fisheries for participation of the Japanese Fisheries Association on a 50-50 basis with Alaska to establish and operate a fisheries research center at Kodiak. A research center and a research vessel are needed first. Hickel stressed that all information developed by the center must be made public.

Hickel added that in his talks with Japanese industrialists he had assured them that no restrictions would be placed on the size of foreign investment in Alaska industry.

Fisheries Complex Planned

The Governor recently announced his three-part program to create a complex of marine research and educational facilities at Kodiak. This is conceived as a Federal-state effort with local government and private enterprise.

The first part of this program is the Alaska Institute of Fisheries Development. The other two are the Alaska Maritime Academy and the Alaska Marine College, a Sea Grant institution.

* * *

PLAN SHIPYARD IN SEWARD

A $2.5 million shipyard with a 1,000-ton capacity and drydocking facilities for eight 150-foot vessels and five 250-foot vessels is going to be built in Seward. It is being funded privately and is expected to be operational by June 1968.

The Resurrection Bay Shipyard, as it will be called, will employ the new Syncrolift method of drydocking. The heart of the system is a platform lowered and raised by paired electric hoists, all interconnected and controlled centrally. The platform has 3 pairs of railway tracks to permit placing the railway truck cradles in whatever position is necessary to fit the hull of the vessel being drydocked.

* * *

KING CRAB VESSELS MUST PASS STABILITY TESTS

Because of king crab vessel losses in Alaska, the underwriters now require each vessel fishing out of Kodiak to have a stability test before renewing its insurance. This is disturbing the industry because no one in Alaska is qualified to make these tests.

The Kodiak fishermen affected are being encouraged to join in a group project to bring in a qualified marine architect.

Oregon

TUNA LANDINGS HIGH

Tuna landings at Oregon ports this season have been the heaviest in the 30-year history of the state's highly important albacore fishery, reported the Oregon Fish Commission on October 24. Biologist Larry Hreha of the agency's Astoria research laboratory said preliminary figures showed 25.5 million pounds of albacore reported. This is 350 percent above the past 30-year average. Although tuna fishing season was practically ended, late reports could push the 1967 total to 28 million pounds.

The highest previous catch was 1944's 22.5 million pounds. In the 30-year period, 1937 to 1966, the average of albacore landings at Oregon ports was 7.3 million pounds.

Season Started Normally

Hreha said this season started normally in mid-July off the southern Oregon coast. Catches were good from the start. By the third week of August, the center of fishing activity had moved up off Newport. Still later, the fish were centered off the Columbia River's mouth and northward off the southern Washington coast.

Seven of the 223 albacore tagged during a Fish Commission tuna investigation cruise in late July were caught in the commercial fishery during September. Recoveries reported were all from live-bait boats and made 35 to 135 miles north of the point of tagging.

Contributing to this year's good landings were the relatively warm water currents off the coast preferred by albacore; the currents persisted all summer. This and exceptionally good weather permitted more intensive fishing throughout the season.

Tuna 60-100 Miles Offshore

The fish were found at their usual distance from shore: 60 to 100 miles. The smaller boats troll with jigs (feathered or plastic lures). In recent years, the larger tuna clippers have been fishing Oregon waters. They use live forage fish as bait and as chum to attract tuna schools. Some local larger boats also have been equipped with live bait tanks. During the season's height, one clipper reportedly caught 119 tons of albacore in one day off southern Washington.

While Oregon waters were active, normally productive southern California fishing grounds were quiet. At one period, California biologists reported that about 90 percent of the California albacore fleet was off Oregon.

Landings Up For Coast States

From 1937 to 1966, average landings at Oregon, California, and Washington ports were 36.7 million pounds. Preliminary estimates are for landings in these 3 states of 46 million pounds this year.

* * *

1967 SHRIMP CATCH SETS RECORD

Oregon's 1967 shrimp catch of 10.2 million pounds topped previous records by a substantial margin. Landings for October, the season's final month, should add another 200,000 pounds, according to a biologist of the Oregon Fish Commission's Astoria laboratory. Average annual landings from Oregon waters during the past 10 years have been 2.5 million pounds.

The previous record landings for Oregon, Washington, and California combined were 9.8 million pounds in 1958. The average total catch for the three states has been 6 million pounds a year since 1957.

Excellent demand for shrimp, coupled with a poor market for bottomfish, attracted more trawlers to the shrimp beds this year. Up to 40 vessels were fishing shrimp off the Oregon coast at one time, compared with 15 to 25 boats during other seasons. Exceptionally good weather and more fishing days also contributed to the record catch.

Vessels and Gear

Most shrimp vessels working Oregon waters are 50-55 feet long. A few 80-footers, which last season fished Washington hake, were on the Oregon shrimp beds this year.

Shrimp are taken in otter trawl nets towed along green mud bottoms 360 to 600 feet deep and 4 to 20 miles off the coast. Productive beds are located offshore near Brookings, Port Orford, Coos Bay, Newport, and Tillamook Head. The Newport bed was located during an Oregon Fish Commission shrimp survey in spring 1966. Landings of about a half million pounds were made from that bed last season. This year the bed produced about

1.4 million pounds. The shrimp reaching the market from Oregon beds average about 3 inches long, the so-called cocktail size, and are mainly 2- and 3-year-olds.

The outlook for next season is promising on the basis of the presence of large numbers of 1966 year-class shrimp, which will be of marketable size by next season. This is especially true on Coos Bay, Port Orford, and Brookings beds, where shrimp of the 1966 year-class predominated in the 1967 catch. (Oregon Fish Commission, Oct. 31, 1967.)

* * *

KOREANS TRAIN AT FISH COMMISSION HATCHERY

Two South Korean fish culturists are learning modern salmon hatchery practices at the Oregon Fish Commission's Sandy River station. After additional on-the-job experience at other northwest fish culture locations, they will return to Korea in January 1968 to manage a salmon hatchery now being designed with U. S. aid. Their agenda includes visits to state fish culture stations.

Chum salmon are present in some Korean streams. Korea's new fish cultural program will be devoted initially to this species. On this side of the Pacific, the species is found from northern California to the Bering Sea, but it is more common in the northern portion of its range. In Oregon, chums (or dog salmon) run relatively late in the fall compared with other salmonids. The young go to sea in the first spring and reach maturity in the 3rd or 4th year. The weight of mature fish ranges from about 8 to 18 pounds.

U. S. Team Visited S. Korea

In June, Ernest R. Jeffries, director of the Fish Commission's fish culture division, toured South Korea as a member of a 3-man team that selected potential hatchery sites. His colleagues were Richard T. Pressey, BCF, and Clinton Atkinson, U. S. Fisheries Attaché in Tokyo.

California

PELAGIC FISH CATCH

The September report of the Resources Agency of California contains these data on the catch of pelagic fish:

Species	September		January 1 - September 30		
	1/1967	1966	1/1967	1966	10-yr. Mean 1956-1965
	(Landings in Tons)				
Anchovy	10	225	28,101	19,023	6,022
Mackerel, jack	310	840	14,729	16,997	21,991
Mackerel, Pacific	35	158	198	1,183	10,656
Sardines	2	67	62	382	9,723
Squid	2	722	8,071	7,223	5,372
Total	359	2,012	51,161	44,808	53,764

1/Estimated. Accumulated landings are revised monthly.

New Jersey

STATE ADOPTS PLAN TO FIGHT WATER POLLUTION

Interior Department's Federal Water Pollution Control Administration (FWPCA) and New Jersey officials agreed at a November 1 conference on a program to control water pollution along 100 miles of the state's coastal waters. FWPCA endorsed a state plan to build a string of regional sewage treatment plants along the coast to pump effluents through pipes extending up to a mile into the ocean. The plants would cost nearly $100 million. The cost of the state's overall pollution abatement program is put at $500 million.

State Health Commissioner Roscoe P. Kandle said: "We are convinced that it is not possible for the bay waters to continue to receive increasing amounts of treated waste water and remain acceptable for shellfish harvesting and recreation uses."

Shellfish Infected

Murray Stein, FWPCA's chief enforcement officer, said the Government had come into the situation because dirty water had infected a large part of New Jersey's shellfish, which are sold interstate. "Clams have truly become an amenity of American life," he said, and should be protected.

Stein said the conference's recommendations would be sent to Interior Secretary Stewart L. Udall for final approval.

State's Program

Richard J. Sullivan, director of the state's Division of Clean Air and Water, said the program would cover about 100 miles of tidal bays and inlets lying behind barrier beaches from Shark River Inlet south to Cape May.

The regional treatment plants would be ready by November 1970. The cost would be met by matching Federal, state, and local funds.

Sullivan said the treated waste would be dumped so far in the ocean that it would not affect the shoreline.

Large Area Can Be Restored

The abatement program can restore about 36,000 acres of New Jersey's 163,000 acres of Atlantic shellfish beds. If this is achieved, New Jersey would replace New York as the leading producer of shellfish.

Virginia and Maryland

VIRGINIA AND MARYLAND SCIENTISTS PLAN CHESAPEAKE BAY STUDY

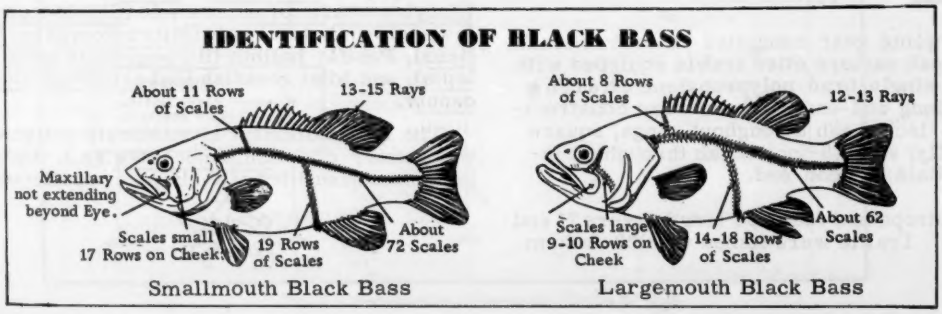
Scientists of the Virginia Institute of Marine Science (VIMS) Gloucester Point, Va., Maryland's Chesapeake Biological Laboratory (CBL), and the Johns Hopkins University's Chesapeake Bay Institute (CBI) met last month at Gloucester Point to discuss their possible involvement in providing data to the U. S. Army Corps of Engineers to construct a model of Chesapeake Bay.

Records of currents and velocities, salinities, and temperatures would have to be made in relatively short periods over a year or more to supply the necessary information. The scientists agreed tentatively that CBI would work in the upper bay, CBL in the middle bay, and VIMS in the lower bay and ocean. All 3 would cooperate in measurements involving the bay's entire length during a single tidal cycle.

The Chesapeake Bay Model would cover about 11 acres in Maryland and provide useful information to those using its marine waters. It would be like the James River Model now being operated by VIMS.

James River Model Used Constantly

Dr. Morris Brehmer, Assistant Director VIMS, noted that the James River Model has been used constantly since it was employed primarily to determine the effect of proposed channel dredging on the seed oyster beds. Four recent studies involved the best design for a land-fill in Hampton Roads to provide additional docking facilities; location of sewage outfalls to lessen damage to other interests; estimate of changes in water temperature resulting from the river's use as a coolant. At present, the Federal Water Pollution Control Board is using the model for pollution studies.



BUREAU OF COMMERCIAL FISHERIES PROGRAMS

"Manning" Surveys Bottomfish in Gulf of Alaska

BCF's John R. Manning returned to Juneau, Alaska, on August 31 after an 8-week exploratory bottom fish survey in the northwestern Gulf of Alaska (Cruise 67-3, July 10-Aug. 31). Operations were conducted in inshore and offshore waters between and due south of Point Elrington and Nuka Bay (see figures 2-3).

Fig. 1 - General Area of Operation, Cruise 67-3.

The cruise's primary objectives were to obtain data on commercial concentrations of bottomfish and locate and log trawlable fishing grounds. Its secondary objectives: to gain more information on bathymetric and geographic distribution of benthic (sea bottom) organisms common to Alaskan waters, and to log sightings of foreign fishing vessels and give this information to Branch of Enforcement and Surveillance.

The Gear

Sampling gear consisted of conventional 400-mesh eastern otter trawls equipped with $\frac{3}{8}$-inch single-brad polypropylene chafing gear along cod-end. Trawls were constructed of 4-inch mesh throughout wings, square and belly; and 3.5-inch mesh throughout intermediate and cod-end.

Headrope and footrope lengths were 71 and 94 feet. Trawls were fished with 22-fathom split "V" dandylines (10-fathom single to main warp with 12-fathom "V" to wings), and a pair of 4.5 x 7-foot Astoria V-doors (800 pounds each). Optional equipment included: (1) 30-fathom $\frac{1}{4}$-inch snag cable, (2) 92-foot $\frac{1}{4}$-inch tickler chain, and (3) roller gear--four 9-inch rubber wing bobbins; two 16-inch round steel bobbins; thirty-eight 6-inch rubber spacers; and five 18-inch, six 14-inch, and six 12-inch rubber rollers.

The Operation

Echo-sounding transects were made to locate trawlable fishing grounds. All soft-bottom areas that appeared reasonably level and sufficiently long were sampled. Hard-bottom trawling was limited to 14 tows--because the entire roller gear assembly was lost off Pye Reef during tow 33. Towing time was generally held to one hour. A 3:1 main-warp scope ratio was used for all drags. Towing speed averaged 3 knots.

Sixty-six of the 79 drags attempted during survey were successful--no solid hang-up or trawl damage occurred. The bathymetric interval for all drags ranged between the 43- and 158-fathom isobaths; most sampling effort was between 80 and 125 fathoms. Total weights recorded from 6 hauls were over 3,000 pounds.

The Catch

The following species, listed in order of decreasing abundance, were collected in quantities of 100 or more pounds for any single tow: turbot (Atheresthes stomias), Alaska pollock (Theragra chalcogrammus), Pacific cod (Gadus macrocephalus), flathead sole (Hippoglossoides elassodon), Pacific ocean perch (Sebastodes alutus), blackcod (Anoplopoma fimbria), rex sole (Glyptocephalus zachirus), dover sole (Microstomus pacificus), Pacific halibut (Hippoglossus stenolepis), and idiot rockfish (Sebastolobus alascanus).

The most dominant invertebrate collected was tanner crab (Chinonoecetes sp.). Only incidental quantities of shrimp were collected.

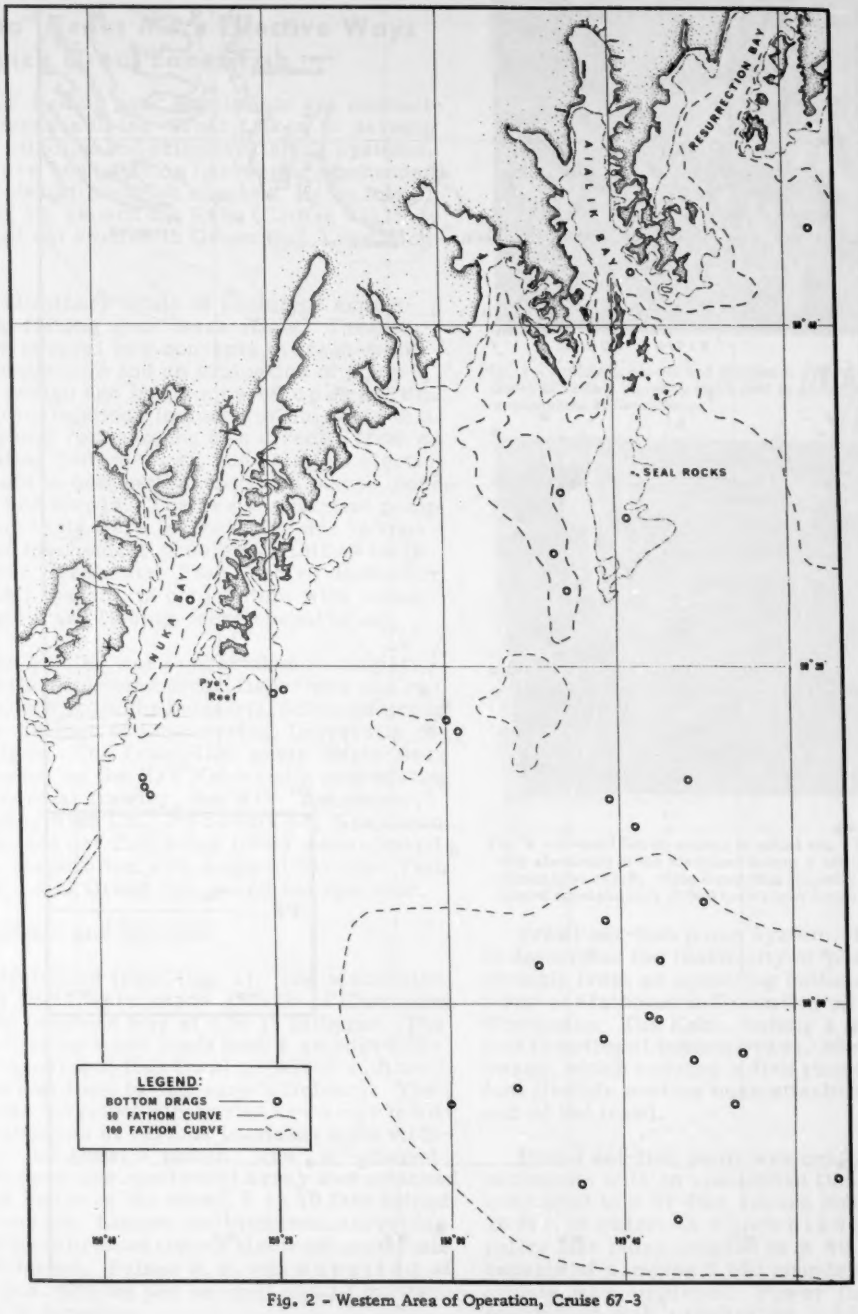


Fig. 2 - Western Area of Operation, Cruise 67-3

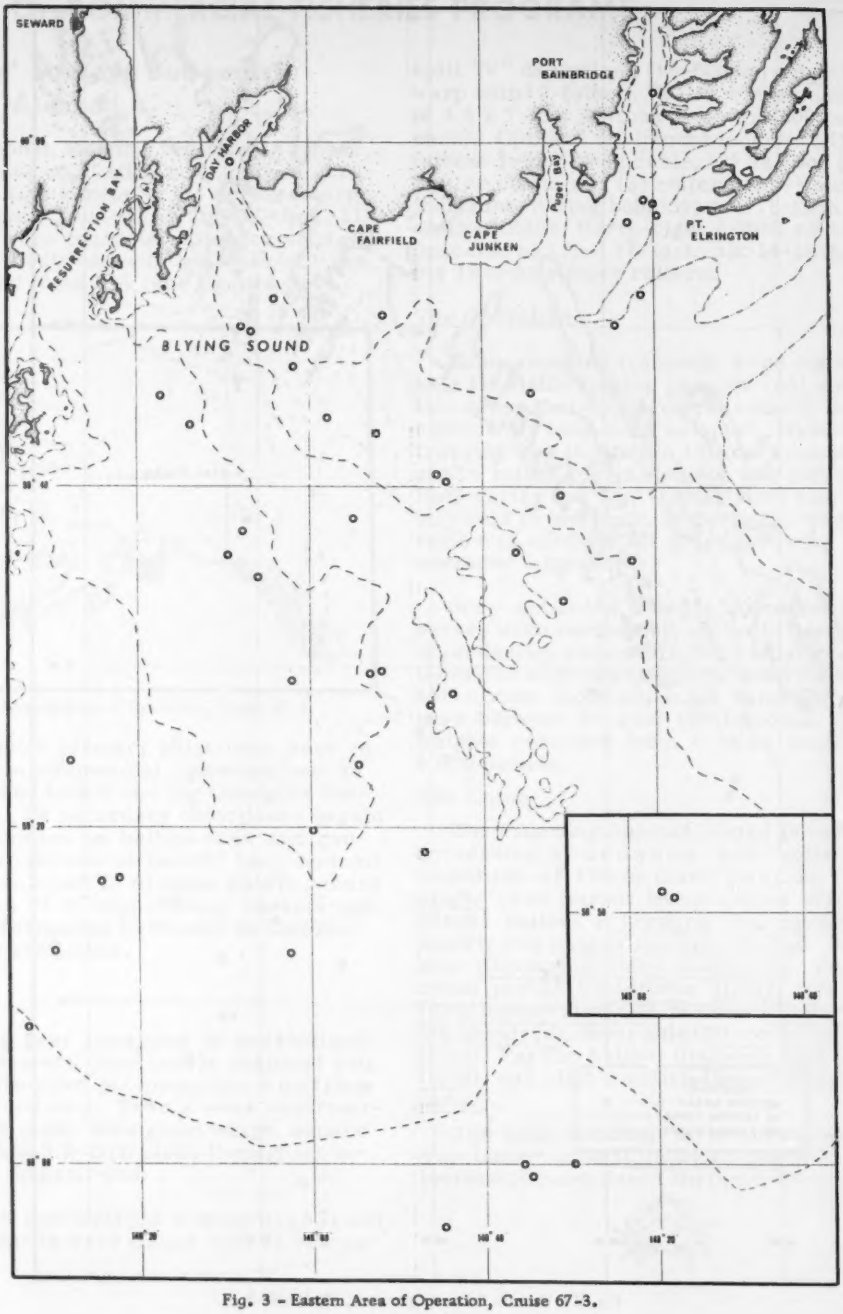


Fig. 3 - Eastern Area of Operation, Cruise 67-3.

"Kaho" Seeks More Effective Ways to Catch Great Lakes Fish

BCF fishing gear specialists are conducting research in the Great Lakes to develop more effective and selective fishing systems. They are emphasizing harvesting of abundant and underutilized fish species. From July 11-August 19, aboard the Kaho (Cruise 43), they carried out studies in Green Bay, Lake Michigan.

Preliminary trials of prototype experimental fishing gear were made. These involved several new concepts in fresh-water fish production and an evaluation of equipment design and mechanics of operation. The investigations included initial tests of a fish pump for pumping fish directly from an operating bottom trawl, and using an electrical field in conjunction with fish pumps, pound nets, and trawls. The trawl net-fish pump system tests were inconclusive due to unexpected mechanical problems. Initial tests with the Freshwater Fish Electro-Motivator (FFEM) system, in conjunction with pound net and trawl fishing, were encouraging.

The studies were undertaken in cooperation with local commercial fishermen and researchers from the Industrial Sciences group of the College of Engineering, University of Michigan. The trawl-fish pump trials were conducted by the R/V Kaho and a cooperating commercial trawler, the M/V "Art Swaer," Schilling Fish Co., Pensaukee, Wisconsin. The pound net-fish pump trials were conducted in cooperation with Angwall-Dormer Fisheries, local Green Bay pound net operator.

Equipment and Methods

Electrified trawl (fig. 1): The electrified trawl tests were made south of Chambers Island in Green Bay at 4 to 12 fathoms. The experiments were made with a standard 52-foot (headrope) fish trawl provided with an electrical field to increase efficiency. The cathode (negative electrode) arrangement was attached at various locations in the vicinity of the trawl's mouth. The "H"-shaped anode (positive electrode) array was attached to the inside of the trawl, 5 to 10 feet behind the cathode. Copper and aluminum screening and tinned braided copper electrode materials were tested. Pulsed d. c. was supplied at 13 p.p.s. (pulses per second) and 10 milliseconds in duration.

Fig. 1 - Attaching copper and aluminum cathode (negative electrode) to 52-foot sampling trawl used in electrified fishing gear experiments in Green Bay.

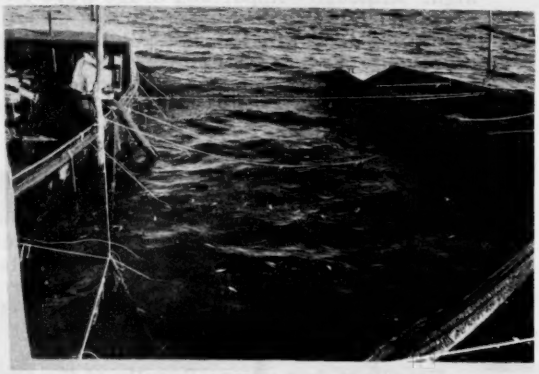


Fig. 2 - Stunned fish on surface in pound net. The anode (positive electrode) of the electrical system is attached to the pump intake hose at left, while 4 cathodes (negative electrodes) are spaced approximately 10 feet apart across the pot of the pound net.

Trawl net-fish pump system: Experiments to determine the feasibility of pumping fish directly from an operating bottom trawl were made at 4 fathoms in Green Bay off Pensaukee, Wisconsin. The Kaho, fishing a standard 52-foot (headrope) bottom trawl, towed the Art Swaer, which carried a fish pump with a 30-foot flexible suction hose attached to the cod-end of the trawl.

Pound net-fish pump system (fig. 2): Experiments with an electrified fish pump were conducted in a 37-foot square pound net set in 18 feet of water. A 6-inch bladeless impeller fish pump coupled to a 40 hp. engine capable of pumping 2,000 pounds of fish per minute was employed. Power for electromotivation was supplied by a 10 kw. single

phase a. c. generator coupled to a solid state pulse-forming unit which supplied pulsed d. c. voltage from 0 to 250 volts d. c. The pulse frequency was variable from 5.3 to 50 p.p.s. and from 10 to 55 milliseconds in duration. The cathode assembly was a series of four 10-foot lengths of $\frac{5}{8}$-inch conduit pipe, each fitted with ten 15-foot lengths of sash chain, spaced 10-feet apart across the pot of the pound net. The anode arrangement was six 20-inch lengths of 1-inch flat steel stock, shaped in the form of a funnel, attached to the mouth of the fish pump suction hose.

Results

FFEM-trawl: Efforts were concentrated on selection of electrode materials and design. Although comparison drags were made during development trials, the most effective electrode system has not yet been tested thoroughly enough to draw definite conclusions. Of the 14 species caught, the electric field appeared to affect alewife, smelt, and white suckers most significantly.

Pound net-FFEM-fish pump: Tests involving the use of electricity to guide fish into a fish pump were partially successful. It was found possible to move alewife only 10 feet. Sequential switching through a series of electrodes will be necessary to remove fish from a normal sized pound net effectively and efficiently.

Trawl net-fish pump: Results of the trawl net-fish pump trials were inconclusive because the tests were limited by the mechanics of the trawl--fish pump hook up and inability of towed pump vessel to stay directly over the trawl.

"Oregon" Dredges Scallop Off Florida

The R/V Oregon returned to St. Simons Island, Georgia, on September 22, after 25 days of scallop-dredging explorations off Florida's east coast. The cruise objective was to provide an up-to-date assessment of grounds that previous explorations have shown to hold the greatest potential for commercial exploitation of calico scallops (Pecten gibbus). This was the first in a series of industrial development cruises scheduled to make an intensive systematic resurvey of the Cape Kennedy scallop beds. 285 fishing stations were occupied between 10 and 40 fathoms.

Largest Calico Scallops

From St. Augustine to Ft. Pierce, commercial concentrations were located over a broad area--from the offings of New Smyrna Beach to Bethel Shoal in 19 to 27 fathoms. The calico scallops found here were the largest in the surveys and provided the largest meat yield to date.

The gear used was 8-foot tumbler dredges with 2-inch bag rings fished with and without liners on bags 13 and 20 rings deep and a 35-foot North Carolina type scallop trawl.

The Catch

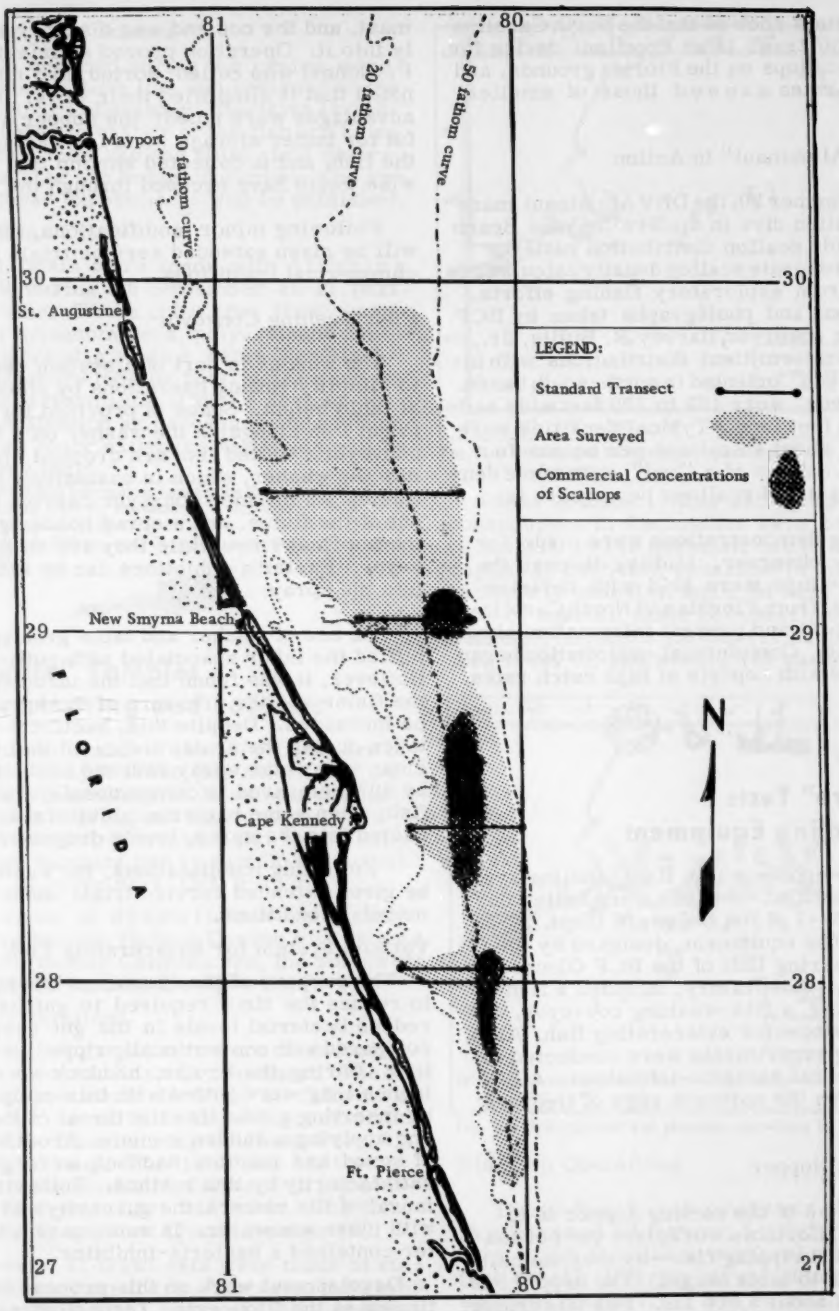
East of New Smyrna Beach, in 25 to 27 fathoms, maximum catches of up to 21 bushels per 15-minute drag (84 bushels per hour) were obtained with a single 35-foot scallop trawl, and 19 bushels per 15-minute drag (76 bushels per hour) with a single 20-ring bag 8-foot tumbler dredge. The best counts averaged 50 to 66 meats per pound, and yields averaged 6 to $7\frac{1}{4}$ pounds of meat per bushel (65 to 70 pounds in the shell. Maximum production rate in this area was 570 pounds of scallop meats per hour per 8-foot dredge.

From Hetzel Shoal to Melbourne, in 21 to 23 fathoms, catches of up to 16 bushels per 15-minute drag were made with a 13-ring bag 8-foot tumbler dredge. Meat counts averaged 68 to 76 per pound, and meat yields averaged 5.3 to 7 pounds per bushel.

Northeast of Bethel Shoal, in 19 to 21 fathoms, catches of up to 16 bushels per 30-minute drag were made with a 13-ring bag 8-foot tumbler dredge. Meat counts averaged 88 to 115 per pound and meat yields averaged 4 to 5 pounds per bushel. The scallops in this area were generally smaller in size and constitute a stock, which should attain commercial size in the near future.

Small "seed" scallops were found throughout the area surveyed.

On September 19, a 100-bushel sample of shell stock was landed for experimental processing by industry.



R/V Oregon Cruise 121.

Gear trials showed that the North Carolina type scallop trawl is an excellent device for catching scallops on the Florida grounds, and that catch rates exceed those of smaller dredges.

The Sub "Aluminaut" in Action

On September 20, the DRV Aluminaut made an observation dive in the New Smyrna Beach area to study scallop distribution patterns and to corroborate scallop density calculations resulting from exploratory fishing efforts. Observations and photographs taken by BCF Pascagoula observer, Harvey R. Bullis, Jr., confirmed intermittent distributions with individual "beds" oriented in north-south bands. Typical "beds" were 100 to 300 feet wide and up to 1,500 feet long. Typical densities were found to be about 4 scallops per square foot within the confines of a "bed", with some densities exceeding 8 scallops per square foot.

Dredging demonstrations were made for an industry observer. Midway through the cruise, meetings were held with industry participants from Florida and North Carolina to provide past and present information about the resource. Commercial exploitation began on October 4 with reports of high catch rates.

"Delaware" Tests Fish-Handling Equipment

Three components of a fish-handling system for groundfish trawlers were tested during Cruise 67-7 of the Delaware (Sept. 20-21, Oct. 1-4). The equipment, designed by the Food Engineering Unit of the BCF Gloucester Technological Laboratory, included a fish-sorting hopper, a fish-washing conveyor, and a vacuum system for eviscerating fish. Also, fish washing experiments were conducted to evaluate several bacteria-inhibitors. All fishing was on the northern edge of Georges Bank.

Fish Sorting Hopper

The purpose of the sorting hopper is to provide a comfortable workplace for personnel sorting and ripping fish--by mechanically elevating fish to table height. The hopper has a capacity of about 5,000 lbs. For this cruise, it was located on the portside just abaft the mast, and the cod end was discharged directly into it. Operation proved satisfactory. Personnel who culled, sorted, and ripped fish noted that it simplified their work. Two other advantages were noted: the hopper was useful for buffer storage when ice was applied to the fish, and it collected shrimp that otherwise would have escaped through the scuppers.

Following minor modifications, the hopper will be given extended service trials under commercial conditions.

Fish Washing Conveyor

The washer is part of a system designed to simplify gutting operations by placing fish at table height. Space is provided for 4 men to gut fish alongside the washer on a table or conveyor. Gutted fish are dropped directly into the washer, which is basically a turbulent flume. An inclined conveyor carries the fish out of the flume, and a spray header gives them a final rinse while they are on the conveyor. Bacteria-inhibitors can be inducted into the spray.

The use of washer and table greatly simplified the labor associated with gutting fish. However, it was found that the turbulence in the flume and the pressure of the spray should be increased. Despite this, bacterial counts taken during the cruise indicated that the clean sea-water spray reduced bacteria levels by 90% compared to conventionally washed fish; when some bacteria inhibitors were inducted into the spray, levels dropped 99%.

Following modifications, the washer will be given extended service trials under commercial conditions.

Vacuum System for Eviscerating Fish

The purpose of the vacuum eviscerator is to reduce the time required to gut fish and reduce bacterial levels in the gut cavity--compared with conventionally ripped and gutted fish. During the cruise, haddock up to 18 inches long were gutted with this equipment by inserting a tube into the throat of the fish and applying a sudden vacuum. About 500 lbs. of scrod and medium haddock were gutted satisfactorily by this method. Following removal of the viscera, the gut cavity was rinsed with clean sea water. In some cases, the water contained a bacteria-inhibitor.

Development work on this process is continuing at the Gloucester Technological Laboratory.

Quality and Shelf Studies

All fish obtained during the cruise were stored in boxes with ice, and returned to the Technological Laboratory. Bacteria levels and organoleptic quality of the fish are being monitored. Shelf life and fillet yield determinations also are being conducted. The results of these experiments will be published.

Fishing Gear Trials

Initial trials were made with 3 fishing gear units during the September 20-21 part of the cruise. These units are: trawl warp load-cell dynamometers, polyurethane impregnated trawl ground cable, and steel framed offshore lobster pots. Data were obtained on performance of these devices to guide modification as necessary and additional testing. More extensive sea trials will be given these units.

Note: For additional information concerning this cruise and program work associated with it, contact: John A. Holston, BCF Technological Laboratory, Gloucester, Mass., or Keith A. Smith, BCF Exploratory Fishing and Gear Research Base, Gloucester, Mass. 01930.

"Delaware" Samples Offshore Herring and Lobsters

The latest cruise of the M/V Delaware of BCF's Boothbay Harbor (Maine) Biological Laboratory was designed to sample populations of sea herring and lobsters and to obtain related environmental data, obtain lobster blood samples, and to sample for larval herring. (Cruise 67-8, Oct. 9-18.)

The areas of operation were eastern Nantucket Shoals, Hudson Canyon eastward to Oceanographer Canyon area, the southwest and northern parts of Georges Bank.

Fishing Operations

Herring: Six trawl sets were made for herring at stations indicated on the chart. The sets lasted up to 2 hours in 30 to 90 fathoms and yielded a total of 35 bushels (approximately 2,400 lbs.). The herring obtained were 22.1 to 35.7 cm. long. The 1960 and 1961 year classes were dominant, followed in percentage by 1959 year class and older. The fish had recently spawned (gonadal stage VII).

Lobster: 21 trawl sets were made at stations indicated on chart. The sets, in 50 to 80 fathoms, yielded 763 lobsters (59% females and 41% males) and ranged from $\frac{1}{8}$ pound to 15 pounds; the mean was 1.3 pounds.

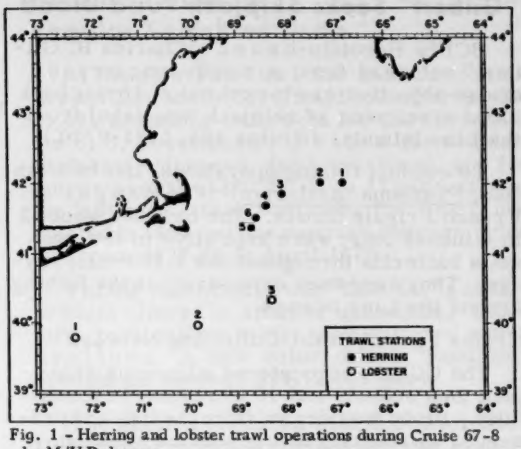


Fig. 1 - Herring and lobster trawl operations during Cruise 67-8 by M/V Delaware.

Other species: Other animal species of consequence in the catches were butterfish ($\frac{1}{4}$ bushel), cod (8 bushels), dab (2 bushels), dogfish (5 bushels), goosefish (8 bushels), haddock (9 bushels), squirrel hake (4 bushels), shad ($\frac{1}{2}$ bushel), skate (1 bushel), squid ($1\frac{1}{2}$ bushels), northern shrimp (12 bushels in herring trawl 3), and whiting (29 bushels).

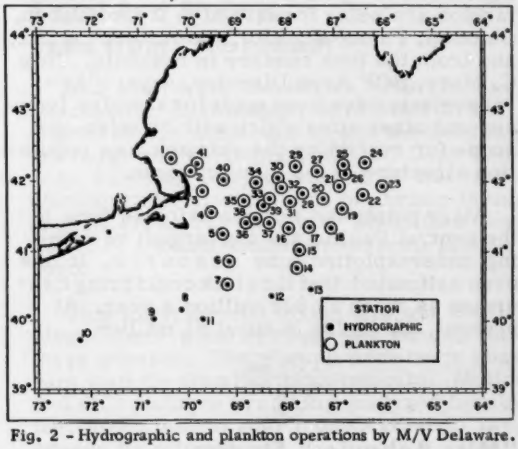


Fig. 2 - Hydrographic and plankton operations by M/V Delaware.

Plankton Operations

Thirty-five 1-meter net tows of 15 minutes (5 minutes at 20 meters, 5 minutes at 10 meters, and 5 minutes at surface) were made (see chart). Herring larvae obtained from 21 stations ranged from 5 to 30 mm.; the mean (total length) was 12 mm.

"Gilbert" Seeks Skipjack Tuna Blood

BCF's Honolulu-based "Charles H. Gilbert" returned from a month-long cruise whose objective was to seek out and bring back blood specimens of skipjack tuna (aku) from the Line Islands. (Cruise 104, 8/31-9/30.)

To conduct fishing operations, live baitfish (iao, Pranesus insularum) were caught at French Frigate Shoals. The baitfish, about 2 to 4 inches long, were kept alive in the vessel's baitwells throughout the 1,000-mile voyage. They were used extensively in the fishing around the Line Islands.

Cruise Part of Blood-Collecting Network

The Gilbert encountered numerous skipjack tuna schools and 10 were fished successfully. Blood was drawn from the fish and preserved by freezing in a glycerine solution. The blood specimens, collected by biological technicians Tagay Kang and Lloyd T. Watarai, were brought back to the BCF Laboratory, where serological analyses will be conducted. The data will aid the Laboratory's evaluation of the Pacific-wide distribution of skipjack tuna.

The cruise represents only one phase of the Laboratory's skipjack tuna blood-collecting network. Specimens collected in similar fashion are being forwarded to it from Japan, Okinawa, Palau, Ecuador, the eastern Pacific, and from the tuna cannery in Honolulu. John C. Marr, BCF Area Director, says: "Arrangements have been made for samples from several other sites which will broaden our scope for evaluating the skipjack tuna population structure in the Pacific Ocean."

Marr points out that the skipjack tuna of the central Pacific are the largest remaining underexploited tuna resource. It has been estimated that the stock could bring fishermen as much as $25 million a year. At present, the figure is about $1 million.

"Miss Behavior" Studies Albacore With Sonar

Miss Behavior of BCF's La Jolla, Calif., Fishery-Oceanography Center cruised the albacore fishing grounds off northern California and Oregon August 28-September 15 to obtain target signatures from albacore tuna using continuous transmission frequency modulated (CTFM)--Doppler sonar. The sonar worked well but there were problems. The fish, moving always at 5-6 knots, changed course repeatedly; whenever their body orientation changed, their targets would fade out.

It is becoming increasingly evident to the researchers that near-surface tuna schools are tricky sonar targets. CTFM sonar scans fast enough to track tunas, but their spacing and orientation within the school make it virtually impossible to maintain contact beyond about 100 meters. Even these short ranges might work well in a seining operation, if the vessel's speed and course changes can keep pace with the fish school's.

BCF Honolulu Attempts Bottom Trawling in Hawaiian Area

BCF's research vessel "Townsend Cromwell" sailed from Kewalo Basin on October 25 for a 3-week research cruise to determine whether commercial stocks of bottom fishes and invertebrates can be found off the Hawaiian Islands. The vessel concentrated on the Maui-Molokai area. The University of Hawaii was cooperating in the cruise.

The Cromwell was using commercial-type bottom trawls provided by BCF's Exploratory Fishing and Gear Research Base, Seattle, Wash. Heater Heyamoto and Robert P. Larson of the Seattle base were aboard for the first days of trawling.

Little Known About Fishery Resources

The grounds trawled lie at depths of 600 to 2,400 feet off the islands. John C. Marr, BCF Area Director, said: "Almost nothing is known about the resources of the sea floor around the islands. Much of our scanty information comes from the voyage of the Government research vessel, "Albatross," about 70 years ago. Since that time, there have been a few sporadic attempts at commercial bottom or near-bottom trawling but none was successful."

Modern trawling depends heavily on echo-sounding equipment, which locates areas where the ocean floor is smooth and allows the ship to avoid rocky areas that tear the trawls. The Townsend Cromwell is equipped with echo-sounders and sensitive sonar.

Marr added: "Around the main islands in the Hawaiian chain, there are 4,330 square nautical miles of grounds we believe may be trawlable. There are about 6,200 square nautical miles of potentially trawlable grounds around the Leeward Islands. If the yield of all these grounds were about 1½ tons a year then Hawaii might be able to establish an industry providing more than 15,000 tons of valuable marine products a year, or more than twice as much as all the current Hawaiian fisheries provide.

"What we hope to find, among other things, is shrimp. There is some evidence that there may be stocks of shrimps on the bottom off Hawaii. Deep-sea fishes sometimes have stomachs full of shrimp. In the Gulf Coast States, shrimp commands a price of about $900 a ton to the fishermen. In addition to shrimp, there may be stocks of valuable bottom fishes."

The bottom trawling was directed by Richard S. Shomura, Chief of the Fishery Development Program at BCF's Honolulu Laboratory. Shomura says it will take several voyages to assess the true potential of the Hawaiian area.

Typhoon Cuts Fish Kill by Grounded Tanker's Oil

Scientists of BCF's Honolulu Biological Laboratory recently assessed damages to fish fauna and invertebrates caused by the grounding of the tanker "R. C. Stover" at Wake Island. The damage was slight, probably because tanker carried mostly jet fuel, aviation gas, and diesel fuel rather than bunker oil. The kill of marine life was about 2 tons--mostly fishes from the shallow reef flats. The scientists detected no harm to the thousands of sea birds that nest on the island.

Another factor that kept fish kill low was typhoon Sarah, which struck shortly after the Stover was grounded. She blew away the oil and partially scoured the oil-fouled parts of the island.

Auction Prices for Regular Sealskins Drop

At the semiannual fur seal auction at Greenville, South Carolina, September 28-29, 21,622 sealskins were sold for the account of the U. S. Government. Prices for regular sealskins--dressed, dyed, machined, and finished--averaged $80.22, down 11 percent from the last sale. This continued the decline started in 1966 that has seen the average price fall from $127.99 in April 1966.

Faring much better was "Lakoda," a sheared product offered in smaller quantities. Other furs, particularly mink, have suffered similar declines. A new color called "Sandrift" brought an average $91.77 per skin.

The auction produced $1,153,000 for the U. S. Government. If prices are not higher at the spring 1968 sale, income for fiscal 1968 will be less than expenditures. If that happens, no payment will be made to Alaska in fiscal 1969 under provisions of the Alaska Statehood Act.

Royal-Red Shrimp Seen from "Aluminaut"

BCF staff from Brunswick, Georgia, and Pascagoula, Mississippi, went down in the chartered sub Aluminaut to see the deepwater royal-red shrimp grounds off Cape Kennedy, Florida. Ten years ago, BCF discovered commercial concentrations of shrimp in this area at 175 to 210 fathoms. Since then there has been a small-scale commercial fishery here.

This experimental diving trip was the first direct observation of royal-red shrimp on these grounds. The shrimp were more abundant than the trawl catches indicate. Motion and still pictures are being analyzed for clues that would lead to gear modification to increase its efficiency.

Also, dives were made out of Miami, at the edge of the Gulf Stream, to 1,600 feet to observe plankton and other midwater forms, and on calico scallop grounds off north Florida.

Ketchikan Studies Shrimp Flavor Retention

BCF's Ketchikan Technological Laboratory (Alaska) has extended its nucleotide studies to include commercial species of Alaskan shrimp during ice holding. Certain nucleotides have flavor-enhancement properties. By studying their degradation during handling and processing, the researchers hope to be able to specify conditions that will retain as much flavor as possible.

Dr. Roy Porter traveled to Wrangell to collect pink shrimp and side stripe shrimp aboard the trawler "Thomas E." Time zero samples were peeled directly from the net and frozen immediately in powdered dry ice. About 50 pounds of each species were placed in ice and transported to Ketchikan for periodic sampling during ice storage. These samples will be compared with similar samples of spot shrimp collected earlier at Ketchikan.

Expands Markets by Air Shipping Fresh Fish

BCF marketing personnel have been working for several months with airline freight companies and midwestern food chains to expand markets for fresh domestic fishery products. Fresh fish from the east and west coasts have been flown to stores in Chicago, Milwaukee and Madison. The early results have been encouraging. Other supermarket chains in the midwest are watching the fresh fish market closely.

U. S. Overseas Trade Shows Will Display Fishery Products

BCF's Office of International Trade Promotion, Branch of Marketing, will take part in two overseas trade fairs displaying fish for use in institutions: catering services, restaurants, hospitals, government agencies, homes for the aged, etc.

The shows will be held at Hotelympia, London, Jan. 9-18, and at the U. S. Trade Center, Milan, Italy, Jan. 20-27.

All processors of fish for institutional use are invited to display their products. Floor space and adequate freezing space will be free. Fishery items must be produced or processed in the U. S.

Dr. Longhurst Named Head of BCF La Jolla Center

Dr. Alan R. Longhurst is the new director of BCF's Fishery-Oceanography Center in La Jolla, Calif. He succeeds Dr. Elbert H. Ahlstrom, who takes up his research on larval fishes at the center.

Fig. 1 - Dr. Elbert H. Ahlstrom (standing) congratulates his successor, Dr. Alan R. Longhurst, as director of BCF's Fishery-Oceanography Center in La Jolla, Calif. (Photo: "San Diego Union")

Dr. Longhurst was associated with the University of California's Scripps Institution of Oceanography since 1963. He served recently as coordinator for EASTROPAC, the oceanographic study of the eastern tropical Pacific conducted by several agencies.

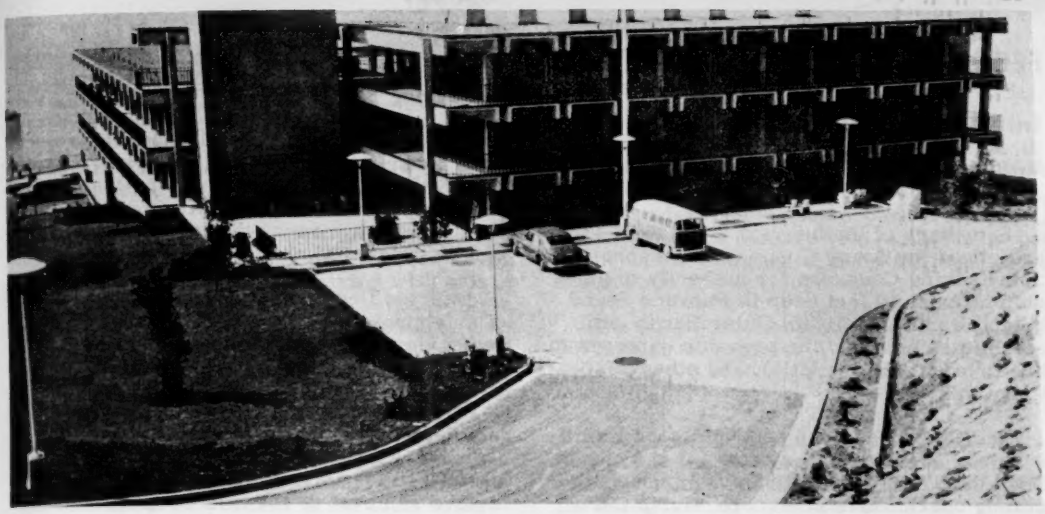


Fig. 2 - Fishery-Oceanography Center in La Jolla, Calif.

La Jolla Is Important Research Center

The Fishery-Oceanography Center is a center for West Coast fishery and oceanographic research. It studies the tunas of the eastern Pacific, and the anchovy, sardine, and jack mackerel resources of the California Current.

Dr. Longhurst, a native of England, received his doctorate in 1954 from the University of London's Bedford College. Before joining Scripps, he did fishery research and held administrative posts in Africa and New Zealand. He has written 40 papers on fisheries and oceanography.

Dr. Ahlstrom Honored

About a year ago, Dr. Ahlstrom was promoted to Senior Scientist, one of six in BCF, but remained as director of La Jolla until Dr. Longhurst was named his successor.

BCF originated the position of Senior Scientist a decade ago and has appointed men of excellent scientific achievement. The appointees are relieved of administrative duties and permitted to devote themselves to their special fields.

Dr. Ahlstrom's Achievements

In 1959, BCF picked one of Dr. Ahlstrom's papers as the Bureau's outstanding scientific publication. In 1965, Interior Department gave him its highest award--the Distinguished Service Award. He is an internationally recognized authority on the egg and larvae stages of marine fishes and has represented the U.S. in this field at scientific meetings around the world. He discovered the distribution and abundance of young Pacific hake, which led to the start of a new fishery in the Northwest. His research pointed the way to the discovery that the Pacific anchovy has replaced--and may be more numerous than--the sardine off California.

Dr. Ahlstrom will publish the findings of his long and extensive study of the young stages of marine fishes. The publications will mirror the fishery resources of the California Current System. Because many major groups of fishes in the world have their equivalents in the California Current, Dr. Ahlstrom's work will contribute a great deal to tomorrow's oceanographers.

FEDERAL ACTIONS

Interior Department

UDALL OPPOSES PAMLICO SOUND CHANNEL PROPOSAL

Secretary of the Interior Stewart L. Udall has urged the Army Corps of Engineers to delay asking Congress for authority to dig a ship channel 40 feet deep in Pamlico Sound behind North Carolina's Outer Banks until scientists can study the probable damages to the abundant fish, wildlife, and other recreational values.

The Corps has been conducting a feasibility study of 7 alternate routes for the channel from the Texas Gulf Sulphur Co. phosphate mining operation near Aurora, North Carolina, to the Atlantic Ocean via one of 5 inlets through the Outer Banks.

Dotted lines indicate alternate channel proposals under study by Corps of Engineers.

Secretary Udall said his Department understands the Corps now plans to ask Congress to authorize construction before the impact on the natural resources has been adequately evaluated. He added:

"We are compelled to take a position in opposition to the proposed channel project until adequate studies and analyses can be conducted which will conclusively demonstrate that the project can be constructed and operated in such a manner that natural resources can be preserved and protected."

Interior Department, recognizing the scope of an appraisal of the effects, has offered to assist the Corps of Engineers in organizing and conducting the necessary studies.

Open waters in Pamlico Sound reach 20-foot depths, less than half needed for proposed channel. The 7 alternate routes range from 50 to 97 miles in length. Construction would involve removal of 120 million to 233 million cubic yards of spoil materials from channel areas of 3,800 to 7,300 acres. Spoil disposal easement sites would range from 19,800 acres to 35,300 acres. A variety of jetties and breakwater structures would be needed to stabilize the inlets and reduce channel shoaling. Project construction would require about 4 years and annual maintenance dredging. The 5 inlets under consideration for the channel's ocean end are Oregon, Hatteras, Ocracoke, Swash, and Beaufort. Except for Beaufort Inlet, all are through Cape Hatteras National Seashore or Cape Lookout National Seashore, both administered by Interior's National Park Service.

Secretary Udall said the Bureau of Sport Fisheries and Wildlife advised him:

"Evaluation of the probable effects of the seven proposed channel routes on fish and wildlife resources is impractical owing to the limited amount of available engineering, hydrological, and biological data. However, it is obvious from the magnitude of the proposed project that sizable damages could occur."

Secretary Udall said the Bureau's preliminary estimates show initial channel construction will destroy fish and wildlife habitat and sessile (attached by base) organisms in area of channelization and spoil deposition. These damaged areas will range from 22,000 to 42,600 acres, depending on route selected. Potentially greater damages can result from alteration of existing salinities, currents, and turbidity levels. These factors play

sizable roles in governing the ecology of the Pamlico Sound estuarine complex. (Ecology is biology dealing with the mutual relations between organisms and their environment.)

In offering to help the Corps, Interior Department said:

"The ecology of this area is governed to a large degree by the fresh-water inflow from four major river systems mixing with salt water encroaching through the several inlets. To this are added a variety of bottom types, tidal and wind currents, nutrients from the upland, and many other elements. These basic ingredients contribute to the immense biological productivity of the area.

"The Pamlico-Albemarle Sound complex contains over 1.6 million acres, which represents about 90 percent of the total estuarine area in North Carolina. Many fishes, such as fluke (summer flounder), croaker, and weakfish (spotted sea trout) utilize the area as a nursery and migrate to other areas as distant as Massachusetts.

"A variety of wildlife species also contribute to the total fauna. The most evident of these are the flocks of migratory waterfowl that over-winter here. Multitudes of shore and marsh birds add to the variety and abundance. The plentiful food supply, diversity of habitats, and relative remoteness of the area combine to make it of outstanding value to aquatic birds and animals. Further importance is reflected by the fact that three State wildlife management area and four National wildlife refuges have been established in the area.

"Commercial and sport fishing and hunting do not represent the total natural value of these North Carolina estuaries and Outer Banks. Of possibly even greater value are the enormous recreational uses from boaters, campers, nature enthusiasts, swimmers, and others. The focal points for many of these activities are the Outer Banks areas of the existing Cape Hatteras National Seashore Area and the newly authorized Cape Lookout National Seashore Area. These areas possess outstanding scenic, historic and recreational values. Cape Hatteras National Seashore Area had 1,133,000 visitors in 1966 and comparable use is expected at Cape Lookout National Seashore Area when it is developed."

* * *

PROTECT MARINE LIFE ON CONTINENTAL SHELF

Three agencies in the Department of the Interior--Geological Survey (GS), Bureau of Land Management (BLM), and Fish and Wildlife Service (FWS)--have signed a memorandum of understanding to cooperate in minimizing possible damage to marine resources on the Outer Continental Shelf during mineral exploration and development.

The Outer Continental Shelf covers at least 850,000 square miles. Portions of it are exceptionally rich in petroleum, natural gas, and sulphur.

"As these resources are developed more fully, it becomes increasingly important for Interior to exercise its legal responsibility for safeguarding aquatic resources," Interior Secretary Udall said. "Experts from each agency will work together in the field and in Washington to see that the delicate ecological system that prevails on the Outer Continental Shelf is not harmed."

Under international convention, the Outer Continental Shelf extends at least to a depth of 656 feet (200 meters), or further if exploitation of the sea bed is possible.

Responsibilities of Agencies

The Geological Survey issues mineral exploration permits and supervises development and production of mineral resources on the Outer Continental Shelf. The Bureau of Land Management issues and administers leases on the Shelf. The Fish and Wildlife Service is responsible for the conservation and management of the commercial and sport fishery resources. It provides advice and assistance on aquatic resources to Survey and BLM.

Survey and BLM will provide FWS with information on marine geophysical explorations supervised by Survey and will give FWS a chance to recommend restrictions in such permits and leases for mineral development.

FWS also may observe geophysical explorations and recommend corrective action if it appears that undue damage to living resources may result.

FWS also will assist Survey and BLM by providing results of periodic studies on

problems of the impact of mineral exploration and exploitation on the commercial and sport fishery resources; and information on aquatic life which relates directly or indirectly to administration of the Outer Continental Shelf lands by BLM or Survey.

The Outer Continental Shelf is an area more than three times that of Texas: 140,000 square miles off the Atlantic Coast, 135,000 off the Gulf Coast, 25,000 square miles off the Pacific, and 550,000 square miles off Alaska.

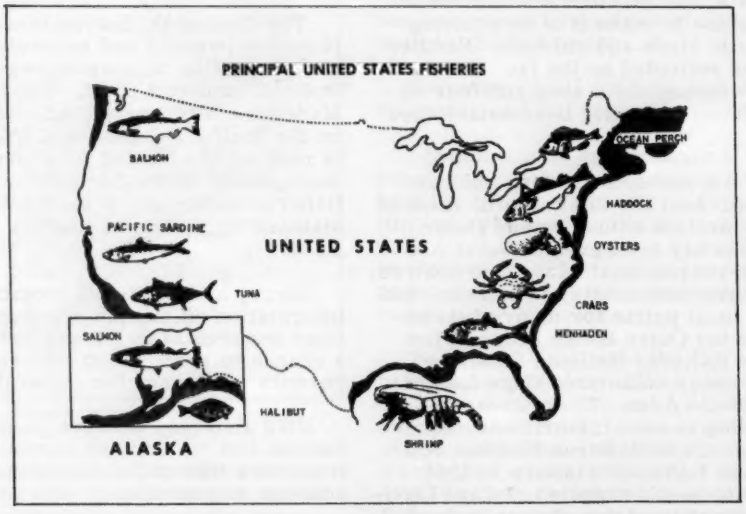
Census Bureau

FISH INCLUDED IN SURVEY OF CANNED FOODS STOCKS

An annual survey of inventories covering distributors' stocks of specified canned foods, including fish, as of December 31, 1967, is planned by the U. S. Bureau of the Census. This is the usual survey covering 30 canned and bottled products, including vegetables, fruits, juices, and fish. The survey would begin not earlier than 30 days after the October 20th publication of the notice in the "Federal Register." This survey and previous ones provide the only continuing source of information on stocks of specified canned foods held by wholesalers--and in warehouses of retail multiunit organizations.

Scientific Sampling of Firms

Reports will not be required from all firms. They will be limited to a scientifically selected sample of wholesalers and retail multiunit organizations handling canned foods. This should provide year-end inventories of the items with measurable reliability. These stocks will be measured in terms of actual cases, with separate data requested for "all sizes smaller than No. 10" and for "sizes No. 10 or larger." (In addition, multiunit firms reporting separately by establishment will be requested to update list of their establishments maintaining canned food stocks.)



INTERNATIONAL

1966 World Fish Catch Up Six Percent

The 1966 world catch of fish and shellfish reached 56.8 million metric tons, 125.2 billion pounds, up 6 percent from the 1965 total of 53.3 million tons. Norway took over fifth place from the U. S. Peru, Japan, Communist China, and the Soviet Union accounted for most of the increase. Their combined catch totaled 27 million metric tons--47 percent of the world total.

Catches were smaller for the Federal Republic of Germany, the Netherlands, and the U. S. (BCF Branch of Fishery Statistics.)

World Fisheries

The United States long was one of the world's major producers of fishery products. Before World War II and until 1959, the U. S. catch ranked second only to Japan's. In 1959, the U. S. dropped to third--behind the expanding fisheries of mainland China. The fisheries of Peru and the Union of Soviet Socialist Republics, which had been close behind, surged ahead and, in 1960, dropped the U. S. to fifth place. In 1966, Norway dropped the U. S. to sixth place.

The 1966 Norwegian fisheries catch was a record 5.8 billion pounds (live weight)--about 28 percent more than in 1965. This increase was produced by larger catches of winter herring and fat herring. There were record catches of capelin and mackerel and a substantially larger haddock catch. The short-term outlook for the Norwegian fisheries is promising. Seasonal fisheries have recorded even better results in 1967 than in 1966. The Norwegian Government has committed itself to a policy of supporting incomes of fishermen and subsidies, loans, and programs to modernize vessels, processing plants, and other facilities.

1966 U. S. Catch

The U. S. catch in 1966 was 5.7 billion pounds (live weight)--the smallest domestic catch since 1953. There were smaller landings of important species (tuna, jack mackerel, Pacific and Atlantic sea herring, yellowtail flounders, and shrimp) in 1966 than in 1965.

More serious was the large decline in landings of menhaden. This is the principal species taken by Atlantic and Gulf fishermen (30 percent of the 1966 catch of all species). The menhaden fishery yielded a disappointing catch of 1.3 billion pounds--435 million pounds, or 9 percent, less than in 1965, and more than 1 billion pounds below 1962's record 2.3 billion pounds.

In 1965, the domestic catch of fishery products accounted for 70 percent of the total U. S. supply of 7.6 billion pounds. By 1966, the domestic catch accounted for only 35 percent of the total U. S. supply of 12.4 billion pounds.

The U. S. failure to maintain its relative position in world fisheries can be attributed largely to its failure to maintain the catches of such important species as menhaden and pilchard. (Food and Agriculture Organization.)

Antarctic Whaling Quota Set

Representatives of Japan, Norway, USSR, and Great Britain, met in Oslo, Norway, to set national quotas for the 3,200 blue-whale units recommended by the International Whaling Commission for the 1967/68 Antarctic Whaling season. On September 2, they agreed on these allocations, which are the same as the previous year's:

	Allocation of National Quota		Ratio of Allocation
	1967/68	1966/67	
	(Blue-Whale Units)		(%)
Japan	1,493	1,633	46.66
USSR	976	1,067	30.48
Norway	731	800	22.86
Total	3,200	3,500	100.00

The Oslo conference was the second meeting of the 4 nations to discuss national quotas. The first, held in London July 4-5, 1967, failed to produce an agreement. ("Suisan Tsushin," Sept. 5.)

New ICES Convention May Become Effective July 1968

Because Italy alone of 16 signatories had not ratified the Convention on International Council for the Exploration of the Sea (ICES), the Convention did not come into force in July 1967. But it was thought that the 15 ratifying Governments might adopt protocol at the October meeting of ICES in Hamburg bringing the Convention into effect among themselves in July 1968. This action would accord with the Convention. (Fisheries Attaché, U. S. Embassy, Copenhagen, Aug. 25.)

To Replace Original ICES

The Convention will replace the older ICES statutes, which were informal agreements not a treaty, adopted in 1902. The U. S., party to the earlier agreement from 1912 to World War I, ratified the new convention April 24, 1967.

Current ICES members and signatories to the new Convention are Belgium, Denmark, West Germany, Finland, France, Iceland, Italy, Netherlands, Ireland, Norway, Poland, Portugal, Spain, Sweden, U. K., and USSR. Canada and the U. S. have applied for membership by accession.

Complete First Cruises in Study of Eastern Tropical Pacific

Scientists and ships of the U. S., Mexico, Chile, and Peru have completed the first survey cruises for Eastropac, the largest ocean research expedition ever to study the eastern tropical Pacific. The program's first 18 months emphasized physical, chemical, and biological oceanography. From 1968 through 1970, major attention will be given to fishery investigations, including development of weather forecasting techniques, exploration, and experimental fishing.

The expedition vessels will cover the area between latitudes 20° N. and S., and from the coast of the Americas to 126° W. longitude. This is roughly from San Diego to northern Chile and some 2,000 to 4,000 miles west.

When the oceanographic work ends, Eastropac will become largely fishery oriented.

Surveyed N-S Course

In the first survey, February-March 1967, the Eastropac vessels made scientific observations on a rectangular north-south course. They surveyed the region intensively for 40 to 50 days at opposite seasons--in February-March and August-September 1967. Another survey is planned for February-March 1968.

Before and after these multiship surveys, 2 single-ship monitoring cruises, each for about 50 days, record ocean climate changes at consecutive seasons by following strategically selected tracts.

Peru and Chile Study Their Waters

The contributions of Peru and Chile consist of observations to at least 300 miles off

their own coasts by the research vessels "Unanue" (Peru) and "Yelcho" (Chile). (Mexico's vessel is the "Yolanda.")

The first buoys used measured ocean and air temperatures, and wind velocity and direction. They monitored and accumulated information on seasonal and year-to-year variations in the ocean environment. This monitoring is considered vital to future weather forecasting.

Six information papers have been issued describing Eastropac. Copies are available from: Dr. Alan A. Longhurst, Coordinator, EASTROPAC, Fishery Oceanography Center, La Jolla, Calif. 92037.

Minimum Trawl Mesh Recommended for South-East Atlantic Hake

The joint research project carried out by the West German vessel "Walther Herwig" and the South African "Africana II" into hake stocks off the South and South-West African coasts had markedly successful results.

The month-long joint program was designed primarily to find a "selection factor" for Cape hake (Merluccius capensis) which could be used as the basis for an international agreement on conservation. The factor would permit the calculation of a minimum mesh size, which would be applied by agreement in trawls of vessels fishing the area. The research team recommended one of 110 mm. ($4\frac{5}{16}$ inches). This would allow a sufficient proportion of immature fish to escape--to minimize effect of heavy fishing.

German Leader Sees Urgent Need

The leader of the German team believes this limitation of net mesh size is virtually the only practicable measure available to check the destructive effect of undisciplined fishing for bottomfish in South-East Atlantic. He believes too that time is running out.

The selection factor--still only in preliminary form--could form key to successful negotiation of a fishery convention for the South-East Atlantic along lines planned by FAO.

A member of German team said: "I regard it as absolutely vital that an agreement should be reached soon. I have studied catch statistics from the major trawl fishing grounds in the world and in my opinion the results we have recorded on this voyage show that at present the South-East Atlantic is as rich as any--including the great fisheries off Iceland and Labrador.

"But on one day we spent on the grounds, I counted 78 trawlers busy fishing--and no grounds can withstand that sort of attack for long without being damaged. The amazing thing is that the fishing is still as good as it is, despite the pace of it."

Evidence of Indiscriminate Fishing

Another member revealed that the Walther Herwig's trawls had dredged up from the bottom net fragments from trawls of unknown foreign trawlers that had snagged their gear.

These fragments indicated a cod-end mesh of only $2\frac{1}{2}$ inches (60 mm.)--well below the size used by the average South African trawler and designed to scoop fish of all sizes.

"This indiscriminate fishing is proof that action is urgently needed to regulate the mesh widths used in the trawls," he pointed out.

The researchers said that hake mature when they are over 40 cm. ($15\frac{3}{4}$ in.) long. From a scientific viewpoint, it would be unwise to catch smaller fish. "Trawling is a selective method of fishing but nevertheless, a cod-end of specified mesh size will capture fish of a wide variety of sizes (ages).

Recommend Mesh Size

"The current experiments were designed to establish the percentage of hake of each size class retained by a cod-end of known mesh size. From the results of fishing, a mesh selectivity factor could be calculated. This was found to be 3 to 5 and is related to the size of the fish at 50 percent retention divided by the average cod-end mesh size.

"From this selectivity factor, it is a simple task to calculate the optimum mesh size to ensure the desired escape rate of the small fish."

The researchers recommended trawl nets with mesh size of at least 110 mm. ($4\frac{5}{16}$ in.) to conserve Cape hake. They believe that the small mesh size presently used by certain trawlers means a heavy wastage of small fish.

"Not only is this unnecessary destruction of small fish adversely affecting the hake stocks but it also represents fruitless effort." ("The South African Shipping News and Fishing Industry Review, July 1967.)

Catch of UNDP/FAO Trawler Sold in Barbados

Fish caught by an exploratory trawler of the UN Development Program/FAO Caribbean Fisheries Development Project were sold in Barbados this summer to test recommendations made by a marketing specialist. The sale was part of the joint project involving several Caribbean countries, UNDP/FAO, and the U. S. Bureau of Commercial Fisheries.

The 19,214 pounds of fresh fish, mainly snapper, had been caught by the "Calamar," one of several new exploratory trawlers used by the Project. They were sold at normal commercial prices to the Barbados Marketing Corporation, which agreed to test modern techniques recommended by the marketing specialist--on handling, packing, storing, and retail sale--after earlier landings.

Public Response Excellent

The iced fish, packed in an insulated fiberglass box, were sold in stalls in town and from a van that visited country districts. The day before the sale, ample publicity was given through radio and press to the sale and to stall locations and the van's route. Public response was excellent. People assembled before the stalls opened and were 4 to 6 deep at counters all day. At one stall, crowds had to be broken into small groups before being allowed to enter.

In the country, the van was overcrowded. A second van was pressed into service to complete the advertised route. On the first day, 11,000 pounds were sold. The remainder, except 1,000 pounds frozen for later use, was sold by 1:00 p.m. the next day. Further tests are planned.

In earlier cruises, 8,000 pounds of fish, mainly snapper, were sold on July 7 to two wholesalers in Kingston, Jamaica, and 11,366 pounds were sold in Georgetown, Guyana.

"Alcyon's" Cruise

The Alcyon arrived at Kingston, Jamaica, on July 7, after a 19-day cruise for experimental snapper fishing on Pedro, Rosiland, and Walton Banks. Of the 8,000 pounds of mixed fish, about 75 percent were yellowtail snapper. The Alcyon left Kingston on July 19 for St. Martin. It arrived on the 23rd to take on bait for 4 weeks of long-lining in the vicinity of the Virgin and Leeward Islands and off Puerto Rico.

The Calamar left Bridgetown on July 11 and returned on the 26th after a trawl cruise off Surinam and Guyana. It made a port call at Georgetown, Guyana; 30,000 pounds of fish were landed there and in Barbados after 6 days' actual trawling.

The "Fregata" left Bridgetown on July 13 after last-minute changes to ready it for bait fishing during "shakedown" cruise to Curacao area. Some live bait was taken at Bequia. Scouting for tuna schools was conducted off the Grenadines, Grenada, and the Netherlands Antillian Islands of Aruba, Bonaire, and Curacao. At least one moderate-size school of skipjack tuna was seen between Curacao and Bonaire; however, the fish would not take live bait and none was captured.

Mexico and U. S. Hold Fisheries Talks

Mexican and U. S. officials completed discussions on mutual fishery problems in Mexico City on September 19 and reported to their Governments. Fishing industry representatives from both countries attended as observers. The delegations agreed on recommendations to their Governments which would regulate the fisheries of each country within the contiguous fishery zone of the other.

If the 2 Governments consider the reports appropriate, they will conclude a formal executive agreement.

The discussions arose out of Mexico's extension, late in 1966, of her jurisdiction over fisheries in adjacent waters to 12 nautical miles from shore. Like the Mexican law on the exclusive fishery zone, the U. S. law of 1966, which extends her fishery jurisdiction to 12 nautical miles from shore, also provides for continuation of such traditional fishing within the zone as may be recognized by the Government having jurisdiction.

Delegations Headed By Ambassadors

The Mexican delegation was headed by Ambassador Oscar Rabasa, Legal Adviser to the Secretary of State for External Relations. It included Antonio Gonzalez de Leon, Director General of the Diplomatic Service, Ministry of External Relations; Enrique Azuara Salas, Director General of Internal Revenue, Ministry of Finance and Public Credit; Jorge Echaniz Ruvalcaba, Director General of Fisheries and Related Industries, Ministry of Industry and Commerce; and Commander Gilberto Lopez Lira, Private Secretary of the Navy.

Co-chairmen of the U. S. delegation were Ambassador Donald L. McKernan, Special Assistant for Fisheries and Wildlife to the Secretary of State, and the United States Ambassador to Mexico, Fulton Freeman. The U. S. delegation included Raymond T. Yingling, Legal Adviser for Special Functional Problems, Department of State; William M. Terry, Assistant Director for International Affairs, BCF; Seton H. Thompson, Southeastern Regional Director, BCF; Gerald V. Howard, Pacific Southwest Regional Director, BCF; Milton J. Lindner, Director, Galveston Biological Laboratory, BCF; Lieutenant Commander C. J. Blondin, Law Enforcement Division, United States Coast Guard; and Philip M. Roedel, State of California Department of Fish and Game. (U. S. Dept. of State, Sept. 19.)

Soviet Fisheries Minister Visits Canada and Great Britain

Soviet Fisheries Minister Ishkov and 6 officials of his Ministry arrived in Ottawa on September 18 to start a 16-day visit to Canada's west and east coast fishing ports, research institutes, and fish-processing plants. Special attention was paid to salmon development programs on the west coast (Big Qualicum River and Babine projects).

In early October, Ishkov was scheduled to visit Expo-67 in Montreal, where the Soviets have a large fisheries exhibit, and then go on to visit Great Britain October 4-14.

Ishkov is returning the visits to the USSR of British Parlimentary Secretary for Agriculture, Fisheries and Food, J. H. Hoy, in 1965, and the Canadian Minister of Fisheries, H. J. Robinchaud, in March 1967. Minister Ishkov had invited them.

Contacts Increase

Accompanying Ishkov were 2 Regional Directors (for Western and Far Eastern Fisheries), 2 officials of the Ministry's Foreign Relations Department, and 2 fishery research administrators.

Both Canada and Britain recently expanded their fishery contacts with East European countries and the USSR. The Canadians sent a team to study Soviet training methods for fishermen, and another team to study the expansion of fishery exports to Eastern Europe. The British sent a fisheries team to Poland, bought fishing vessels from her, and exchanged fishery scientists with the USSR.

Mediterranean Tuna Group Meets

The tuna research working party of the General Fisheries Council for the Mediterranean (GFCM) met in Sicily, May 22-24, and discussed catch and effort statistics, standardization of measurements, and development of a tagging program.

The participants adopted recommendations to provide separate statistical data for each species of tuna; to take into consideration various types of fishing methods when determining catch and fishing effort; to tabulate bluefin weight and length using ICES data methods; to obtain sport fishermen's cooperation in tuna recapture and tagging programs; to undertake one or more international expeditions for tuna surveying, exploratory fishing, and tagging under GFCM's aegis; and to have FAO sponsor a seminar on the dynamics of fish populations for Mediterranean research workers.

A report of the May meeting will be presented to the 9th Session of the GFCM, in Split, Yugoslavia, Dec. 4-10, 1967. (Circular 18, VII, 1967, GFCM.)

Iceland and West Germany Protest EEC Fisheries Policy

Iceland's Ambassador to the European Economic Community (EEC) visited Robert Mansholt of the EEC Commission on September 14 to seek Community reversal of its decision to decrease Germany's tariff-free quota on iced fish (haddock, ocean perch, and flatfish) from 11,000 to 4,500 metric tons.

Excluded from the quota are cod and saithe, which will now be assessed the higher 9-percent duty; so too will haddock, ocean perch, and flatfish outside the quota. Icelanders would like tariff-free or lower-duty treatment for both categories. (U. S. Embassy, Reykjavik, Sept. 14.)

W. Germany Protests EEC Policy

A Brussels report says the West German Government has strongly protested EEC's fisheries policy. EEC quotas on certain of the most important fish are set much lower than the West Germans desire. Also, some species that earlier were included in the customs quota have been removed just as the customs duties were increased. West Germany expressed concern that these changes will be detrimental to trade conditions for nonmember countries. The most important suppliers of fish to the EEC are the Nordic countries and Iceland. West Germany noted also that EEC countries are not capable of delivering the amount of fish needed by German importers. Further, there is a risk that the lower EEC quotas will increase prices on the German market. ("Politiken," Sept. 12; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Sept. 15.)

Denmark Recognizes West Germany's Traditional Fishing Rights

West Germany's traditional fishing rights within Denmark's new 12-mile fishery limit have been recognized following negotiations in Copenhagen. Denmark considered the German claims in accordance with the London Fisheries Convention of 1964. German fishermen will be allowed to fish flatfish off the Danish west coast as far north as the village of Bovbjerg--and to fish for shrimp off the southern Jutland coast.

Germany To Extend Her Limits

Preliminary discussions were held on possible Danish claims of traditional fishing when Germany extends her fishery limits in the near future. No agreement was reached on Danish claims, but the positions of the two countries were more clearly defined. ("Vestkysten," Aug. 24; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Sept. 15.)

Norwegians to Manage Ghana Fishing Operation

On August 31, after several months of negotiation, Ghana signed an agreement with a Norwegian company to improve Ghana's fishing industry. The company is obliged to operate the State Fishing Corporation (SFC) on a strictly commercial basis--to transform the debt-ridden enterprise into a paying concern. For its part, Ghana must keep the Corporation's vessels seaworthy and provide adequate docking, loading, off-loading, and storage facilities. The contract also stipulates that the number of expatriate employees should be kept as low as possible. Since early in the year, the SFC has operated 6 stern trawlers built by the Norwegian firm. (U. S. Embassy, Accra, Sept. 10.)

Netherlands Adds Synthetic Protein to Flour for India

A synthetic protein booster called "lysine" was added to a shipment of flour on August 22 from Rotterdam to India. The proportion was 11 tons of lysine to 5,500 tons of flour. Lysine is produced from coal and boosts the protein value of grains. It has been described by some food experts as "a product which may revolutionize the world's food problem."

Only 1 or 2 kilos added to a ton of wheat can bring wheat up to its required protein value. One kilo of lysine costs 27½ U. S. cents.

Lysine will be manufactured in large quantities in a plant in Geleen (Limburg), the Netherlands. It is scheduled to be opened by the end of 1967. (U. S. Embassy, Hague, Sept. 5.)

World Fish Meal Production Up 3% in First Half 1967

The production of 1.9 million metric tons of fish meal during first-half 1967 was more than 3 percent above the 1966 period. Production in Peru, Norway, South Africa, Denmark, Canada, Sweden, West Germany, and the United Kingdom increased this year.

	June		Jan.-June	
	1967	1966	1967	1966
	(Metric Tons)			
Canada	8,729	7,190	35,665	33,851
Denmark	20,942	15,554	61,411	50,560
France	1,100	1,100	6,600	6,600
German Fed. Repub.	5,503	5,187	36,565	35,752
Netherlands	1/	1/	1/	2/ 1,510
Spain	1/	1/	1/	1/
Sweden	377	422	2,756	1,874
United Kingdom	7,109	6,984	40,511	47,147
United States	28,543	30,766	65,638	65,133
Angola	3,219	2,982	20,607	23,511
Iceland	11,695	19,134	44,762	60,638
Norway	60,683	56,972	282,344	232,099
Peru	30,636	5,922	1,029,262	968,891
So. Afr. (including S.-W. Afr.)	32,479	47,549	214,823	177,140
Belguim	375	375	2,250	2,250
Chile	17,148	19,698	67,648	135,472
Morocco	1/	1/	1/	1/
Total	228,538	219,835	1,910,842	1,842,428

1/Data not available.
2/Data available only for January-April 1967.
Note: Japan does not report fish meal production monthly to the International Association of Fish Meal Manufacturers. In 1965, she produced 356,000 metric tons of fish meal, according to the Food and Agriculture Organization "Yearbook of Fishery Statistics, 1965" vol. 21.

FEO Meal Exports, Jan.-July 1967

Member countries of the Fish Meal Exporters' Organization (FEO), which accounts for about 90 percent of world exports of fish meal, are Chile, Angola, Iceland, Norway, Peru, and South Africa/South-West Africa. Their exports in January-July 1967 were:

	July		Jan.-July	
	1967	1966	1967	1966
	(1,000 Metric Tons)			
Chile	1.9	25.8	56.5	117.0
Angola	1/	5.2	1/	27.9
Iceland	11.1	16.0	83.2	81.3
Norway	37.8	17.7	259.8	129.6
Peru2/	132.7	111.0	883.4	858.3
So. Africa (including S.-W. Africa	29.7	15.8	153.4	89.7
Total	1/	191.5	1/	1,303.8

1/Not available (18.4 thousand tons through May 1967.)
2/129.1 thousand tons exported in August 1967; total Jan.-Aug. 1967, 1,012.5 thousand tons; Jan.-Aug. 1966, 945.3 thousand tons.

Fish Meal Conference Held in Norway

The Seventh Annual Conference of the International Association of Fish Meal Manufacturers (IAFMM) was held in Bergen, Norway, through the week beginning September 4. Over 100 leading producers, fishing industry scientists, and nutritionists from many countries attended.

The 16-member-nation Association has liaison with FAO. It meets regularly in the member countries. This leads to better understanding of industries and problems. It helps producers and scientists advising the industry to cooperate more closely in producing and marketing a high-quality product, which is used primarily in intensive poultry and pig feeding.

The participants reviewed the present world market and methods of market research and promotion designed to ensure regular supplies of fish meal to consumers at prices that ensure maximum usage of animal feeds. Although the association considers commercial matters, its activities are advisory and do not deal with price or control of markets.

Increased Production Was Foreseen

The participants had foreseen that during 1967 increased production would be matched by increased consumption. They stressed that considerable stocks were necessary for orderly marketing--because of seasonal fishing in some major producing countries, weather conditions, and fluctuating catches.

They reviewed methods of keeping users more aware of the high nutritional value of fish meal, particularly in countries using relatively less meal in animal feeds. An intensified program of promotion will be started.

Developments and increased interest in the manufacture of fish protein concentrate (FPC) for human consumption were discussed. This is considered a problem of economics and acceptance--rather than of manufacture.

Analysis of Fish Meal

The Scientific Committee and Working Groups agreed on appropriate methods of analyzing fish meal. They drew attention to the effect of sampling errors and the need for detailed sampling procedures.

At a special session, leading agents, importers, and brokers in the fish meal trade discussed matters of mutual interest.

1967 World Trade and Output of Marine Oils

It is estimated that exports of marine oils in 1967 will be about 7 percent above 1966 and the largest since 1962. An estimated 850 short tons will be exported compared with 795 tons in 1966 and 906 in 1962. The increase reflects estimates of record net exports of fish oil, 520 tons, partly offset by a further decline in whale oil.

World production of fish oil, however, is forecast at 1,020 tons, up slightly from 1966's 1,001 tons.

Record world exports of fish oil in 1967 are forecast, continuing an upward trend. The expected increase reflects larger movements of anchovy oil from Peru and herring oil from Norway. However, exports of herring oil from Iceland, menhaden oil from the United States, and anchovy oil from Chile are expected to decline somewhat. The Peruvian fishing season again was closed during June-August 1967. The shutdown continued until the last week of September. Fishing conditions in last 3 months will be an important factor governing 1967 exports.

Whale Oil Output Down

Production of whale oil in 1967 will continue downward--for the sixth consecutive year. This reflects further reductions in operations in compliance with reduced Antarctic pelagic catch quotas for 1966/67 season. Because whale stocks have been threatened by extinction, the International Whale Commission acted on the recommendations of scientists and cut the 1967/68 Antarctic pelagic quota to 3,200 blue-whale units--300 less than in 1966/67.

The 1966/67 catch results in blue-whale units (1965/66 bracketed) were: Japan, 1,633 (2,340); USSR, 1,069 (920); and Norway, 801 (829). The actual Antarctic catch in the 1966/67 pelagic season was 71,155 short tons, compared with 83,955 in 1965/66.

World Exports of Marine Oils, Average 1955-59, 1960-64; Annual 1964-66; Forecast 1967

Period	Whale	Sperm Whale	Fish 1/	Total
	(1,000 Short Tons)			
1967 2/	155	175	520	850
1966 3/	175	170	450	795
1965	211	170	430	811
1964	249	165	384	798
Avg. 1960-64	356	137	347	840
Avg. 1955-59	427	119	160	706

1/Includes liver oils. Net exports.
2/Forecast.
3/Preliminary.

Complete information on sperm oil production is not currently available. However, output this year may not differ significantly from 1966. ("World Agriculture Production and Trade," Statistical Report, U. S. Department of Agriculture, Sept. 1967.)

New Double-Reeled Power Blocks Marketed

A Scandinavian firm is marketing 3 power blocks of a new type said to permit smoother and more rapid hauling of the purse seine. The 2 larger sizes, of 2 and 4 tons pulling capacity, have double reels separate from each other that can be rotated independently or in unison. These blocks are carried by a hydraulically operated crane.

A smaller model, of one-ton pulling capacity, is designed for use aboard smaller vessels that fish small nets, shrimp trawls, or purse seines. The two spools of this smaller unit cannot be rotated independently. ("Fiskaren," June 7; Regional Fisheries Attache', U. S. Embassy, Copenhagen, Sept. 15.)

FOREIGN

CANADA

TESTS MID-WATER HERRING TRAWL SUCCESSFULLY

A midwater trawl for herring was tested successfully in Canada. A converted scallop dragger caught 200 tons in the last week of August--including as much as 30 tons in a single 30-minute haul. The catch was made off west side of Digby Neck, Bay of Fundy, in daylight, when herring were too deep and dispersed for successful purse seining.

The vessel fished in 25 to 40 fathoms with the net 1 to 20 fathoms off the bottom. When fishing, the trawl measures 70 feet wide, 40 feet deep, 300 feet long, and is spread by steel hydrofoil otter boards each weighing 1,400 pounds.

Fishing Industry Interested

Early success of this government project is arousing the interest of the fishing industry. This is the first time large quantities of herring have been taken by a Canadian trawler off the Atlantic coast. Tests are continuing. (Department of Fisheries, Information Branch, Sept. 12.)

* * *

EXPERTS CONFER ON FISH PROTEIN CONCENTRATE

The potential of marine life as a source of protein has long been realized. But only in the past decade have technological advances made it possible to extract protein from previously underexploited sources of fish in commercial quantities. The development of fish protein concentrate (FPC) is becoming increasingly important in providing rich but inexpensive additives to such foods as cereals and rice. It may help to fill the ever-widening gap between food needed by the world's hungry millions and the amounts available to them.

Over 200 Participate

These possibilities have generated worldwide interest in FPC. Attesting this interest, more than 200 scientists, food and pharmaceutical experts, government administrators, economists, technologists, and engineers met in Ottawa on October 24 and 25. About 20 papers were submitted by Canadian, U. S., and United Nations specialists on all aspects of FPC development. These included availability of raw material, methods and costs of production, quality of product and need, markets, and techniques and equipment needed for large-scale production.

FPC's Future Promising

Some participants predicted that the meeting will have a great impact on both governmental and industrial FPC programs to benefit the world. Over a ten-year period, tests using FPC were conducted to improve the diets of undernourished children in Peru, Indonesia, Mexico, and other countries. They have shown remarkably good results. Besides its humanitarian aspect, FPC is thought to have great possibilities as a commercial product. Highly refined FPC has no objectionable odor or taste, which helps its cause. (Dept. of Fisheries, Ottawa, Canada, Sept. 20.)

* * *

TUNA FIRM INTERESTED IN ECUADORAN FREEZING PLANT

A press release of the Canadian Foreign Ministry stated that a Montreal company is interested in establishing a fish-freezing plant in Ecuador. The firm's General Manager planned to visit Ecuador to discuss this proposal with local authorities. (U. S. Embassy, Quito, Aug. 2.)

* * *

BRITISH COLUMBIA CHANGES SALMON EXPORT REGULATIONS

British Columbia fishery regulations have been amended to permit export of coho salmon in any form throughout the year.

Also, the amendment adds "frozen" to the forms in which pink salmon may be exported, in addition to canned, salted, smoked, and cured.

* * *

Canada (Contd.):

LANDINGS DROP IN FIRST 6 MONTHS

Canadian sea fisheries landings (including Newfoundland) during January-June 1967 were 833.2 million pounds with an exvessel value of C$49.4 million. These compare with 887 million pounds worth $56.2 million in the 1966 period. (Excludes seaweeds.) The figures are from the June 1967 "Monthly Review of Canadian Fisheries Statistics."

Landings and exvessel values of principal species:

	Jan.-June		Jan.-June	
	1967	1966	1967	1966
	Landings		Value	
	. . (1,000 Lbs.) . .		. . (1,000 C$) . .	
Atlantic Coast:				
Cod	186,012	239,123	8,232	10,453
Haddock	60,251	65,130	4,170	4,659
Pollock	27,121	18,345	621	722
Flounder & sole	102,713	94,465	3,477	3,204
Herring	236,632	144,915	2,615	1,658
Ocean perch	27,121	40,678	687	1,078
Swordfish	439	623	294	379
Lobsters	20,097	23,797	12,882	13,669
Scallops	5,803	7,540	3,171	2,909
Pacific Coast:				
Halibut	9,471	15,056	2,334	5,195
Herring	89,244	137,853	1,488	2,305
Salmon	8,602	7,954	3,698	3,495
Cod	5,589	14,293	396	987

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OYSTER FISHING IN NEW BRUNSWICK

Public fishing for oysters will be allowed from October 1 to November 30 inclusive in the Richibucto River, New Brunswick, Canada. The area is upstream of the Main River Bridge to Brown's Yard, in a section of the Molus River downstream from Warman's Point and in the Nicholas River upstream from Methodist Point.

The decision to allow a 2-month oyster season this fall was prompted by the severe loss of income from poor lobster catches in District 8 this season, and the inadequate use of the main river, and no use at all of the St. Nicholas River, during the spring season for oysters now allowed. (Dept. of Fisheries, Ottawa, Canada, Sept. 19.)

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REPORT ON TRADE IN FISH MEAL AND MARINE OILS

Production of fish meal for first-half 1967 was 31 million pounds (15,500 short tons), up 21.4 percent from first-half 1966. Despite this production increase, exports of fish meal declined slightly, to 11.9 million pounds (5,950 short tons), by June 30, 1967.

Production of marine oils during first-half 1967 of 3.1 million U. S. gallons was 3.3 percent above the 3 million U. S. gallons in the 1966 period. Almost all was herring oil, with insignificant quantities of seal and other marine oils included.

	January-June	
	1967	1966
	. . . . (1,000 Lbs.)	
Fish Meal:		
Exports	1/11,920	1/12,286
Imports	-	8
Marine Oils:		
Exports:		
Cod liver	2,453	2,338
Herring	2,493	100
Whale	1,845	697
Other	421	1,054
Total	7,212	4,189
Imports	7,310	2,414

1/Mostly to United Kingdom and U. S.

Exports of marine oils increased from 4.2 million pounds for first-half 1966 to 7.2 million pounds this year. Imports, however, increased even more--to 7.3 million pounds this year, compared with only 2.4 million pounds a year earlier. (Foreign Agricultural Service, U. S. Embassy, Ottawa, Oct. 6.)

LATIN AMERICA

Mexico

JAPAN TO NEGOTIATE FISHING RIGHTS IN MEXICO'S 12-MILE ZONE

Japan will seek Mexico's permission this year for Japanese tuna long-liners to continue fishing within the latter's 12-mile fishery zone. Mexico's new law, which became effective in January, established a 3-mile exclusive fishing zone beyond the present 9-mile territorial sea limit. However, it allows foreign nationals already fishing within the 12-mile zone to continue without restrictions for one year.

Fishing Extension Can Be Negotiated

During that year, Mexico would negotiate with those countries conditions under which their nationals would be permitted to continue fishing for five more years, beginning January 1968. When the new law was enacted, Japan made a representation to Mexico claiming she could not recognize the fishing zone established unilaterally and that such a law has no effect internationally. ("Suisan Keizai Shimbun," Sept. 5.)

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WEST GERMANY TO GIVE MEXICO $1 MILLION RESEARCH VESSEL

The German Federal Republic is giving Mexico a US$1 million fishery research vessel. The 100-foot vessel will be built as a practical fishing craft. With a crew of 10 and 6 scientists, she will conduct exploratory fishing under the Mexican Department of Fisheries. This action is part of a U. N. Special Fund Fisheries Development Project awaiting final approval and expected to be operating soon. Details remain to be worked out.

Mexican technicians will visit Hamburg to familiarize themselves with the vessel scheduled to be completed next year. During August, 2 representatives of the W. German President visited Mexico to discuss the vessel.

* * *

SELLS 6 SHRIMP VESSELS TO VENEZUELA

Six shrimp vessels built in Mazatlan, Mexico, have been sold to Venezuela. Each cost US$90,000, is 22 meters (72 feet) long and 6 meters (19.7 feet) wide, and has a 380-hp. engine. They were delivered to Lacustre de Pesca, Maricaibo. ("El Rio," Aug. 21.)

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FIRMS MAKE SHIPBOARD FISH MEAL PLANTS

Portable fish meal plants, designed for use aboard shrimp trawlers, are available through these 2 firms: Ing. Hector Vargas, Productos Marinos Industrializados, S. A., Avenida Chapultepec 151-1, Mexico, D. F.; Ing. Carlos Diez de Sollano, Montevideo No. 29, Mexico 14, D. F.

Plants are the "instantaneous" type: fish go into hopper and come out as meal in a short time. The meal produced is good quality but high in moisture and oil content. Quality varies with species. Best results are reported with lean fish. Meal has a good market in Mexico, where law requires local product to be used before imported meal. Plant with a capacity of 5 metric tons of raw fish per 24 hours (1 ton meal) costs US$11,200. It can be run off ship's engine.

Plants have not been tested in U. S., although fresh-water rough-fish control agencies are interested. (U. S. Fisheries Attaché, Mexico, Sept. 6.)

Brazil

FISHERIES STUDY GROUP FORMED

The Sao Paulo fishing industry has formed a working group under auspices of the Sao Paulo State Department of Agriculture to recommend methods of developing fishing, fish processing, and distribution within the State. The Department will work with the State's marketing agency (CEASA) and the Federal agency in charge of fisheries development (SUDEPE) to implement measures to be recommended by the working group.

The new group has identified the industry's major need as the creation of an adequate infrastructure for industrialization of fishing and distribution of fish to consumers.

Brazil (Contd.):

SUDEPE and the Department emphasized that adequate funds to finance development projects are available from several Brazilian Government and foreign sources. (U. S. Consulate, Sao Paulo, Aug. 15.)

Argentina

REPORT ON FISHING INDUSTRY

The 1966 Argentine fish catch was 250,825 metric tons. In 1965, it was 205,044 metric tons; in 1964, 168,542.

The 1966 sea catch of 211,066 tons was up 47 percent from 1965, and the freshwater catch of 10,091 tons was down 31 percent. About 48 percent of the catch went to canning, salting, freezing, and filleting plants; about 40 percent to fish oil and meal processing plants.

Over 92 percent of the 1966 fish catch was delivered to Mar del Plata, which has become the center of the fishing industry because it has plants for fillets, fish meal and oil, and canning.

Processing Facilities

There are an estimated 65 firms engaged in fishery enterprises, many integrated plant operations. There are an estimated 52 canneries, 40 filleting and freezing plants, 67 salting and drying plants, and 12 fish meal and oil plants.

In 1966 and early 1967, 7 additional fish meal plants were opened in Mar del Plata, Necochea, and Quequen. (Only 8 plants were operating in early September 1967.)

During 1966, about 40 percent of the catch was used for reduction. Fish meal factories operated at about 65 percent capacity. Nevertheless, fish meal and oil production are the only industrial sectors showing advances.

Processors of canned fish products have been forced to hold down production due to a leveling off of domestic consumption, which resulted in early 1967 in a stock build-up.

Plant investments of all fish industrial activities total more than 3.14 billion pesos (US$8.97 million).

Fish meal production was 21,282 metric tons, or 44.6 percent more than 1965's 14,716 tons. Fish oil production of 1,464 tons was 55.6 percent over 1965's 941 tons.

The potential of anchovy resources has been determined by a national laboratory and FAO as one million tons per year.

In late 1966, Machiavello S. A. opened its PROMASA fish meal factory in Mar del Plata, with an estimated investment of US$300,000. Annual capacity of the plant is 9,000 tons of fish meal and 2,250 tons of oil.

Exports Rose

Exports of fish products in 1966 were 13,210 metric tons, triple the 1964 figure of 4,585 metric tons. Fish meal and oil have a market in Western Europe and the U. S.

Imports during 1966 rose to 10,608 metric tons from the 1964 level of 4,746 metric tons. They consist of crustaceans and molluscs from Chile, Peru, and Uruguay. Imports of frozen bonito and green cod have begun to fall off, due to the increased catch beginning in early 1967. In 1965, Argentina was a net importer of 11,905 metric tons of fish meal; in 1966, she was a net exporter of 1,571 metric tons. Most meal exports go to West Germany; most imports come from Peru.

Ecuador

FISHERY PRODUCTION AND EXPORTS DROPPED IN 1966

Ecuador's fishery catch in 1966 dropped to 48,200 metric tons from 53,500 tons in 1965. Exports also declined in 1966: 9,200 tons of fishery products bringing US$4,200,000 compared with 1965's 10,300 tons worth $4,400,000. Fishery products ranked fifth as an earner of foreign exchange.

Government plans to bolster the fishing industry have been hampered by lack of

Ecuador (Contd.):

modern vessels. Despite large red shrimp beds discovered offshore, the lack of suitable vessels limited the shrimp catch to inshore areas yielding "titi," "pomada," and "tigre" varieties.

A few small seiners fished experimentally for tuna, but most of the catch continues to be caught by pole-and-line fishing. No tuna vessels had refrigeration at the end of 1966. The spiny lobster catch was incidental.

Landings and Exports of Fishery Items, 1962-1966

	1966	1965	1964	1963	1962
	(1,000 Metric Tons)				
Tuna landings	12.0	14.8	9.8	13.5	11.5
Shrimp landings	5.3	5.7	5.0	5.2	4.7
Spiny lobster landings	0.2	0.3	0.3	0.4	0.2
Total whole frozen tuna exports	5.0	5.1	3.1	3.7	3.8
Exports to U. S.:					
Canned tuna	1.7	2.0	1.8	1.4	1/
Whole frozen tuna	4.9	5.0	2.4	2.1	1/
Shrimp, frozen	2.4	2.6	2.4	2.4	2.2
Spiny lobster, frozen	0.1	0.1	0.1	0.1	1/

1/Not available.

Several fish meal plants were added to process waste, but lack of fish resources probably would hinder an expansion of production.

Peru

TROUBLED FISH MEAL INDUSTRY STARTS SLOWLY

The fishing season opened in Peru on September 1, but producers refused to open their plants because they wanted tax relief. Fishermen wanted more jobs and increased wages. The Government wanted increased wages for fishermen, higher import and export taxes, and retention in Peru of 40 percent of export profits. There were premature reports early in September that some vessels had started to fish.

In August, the Government had granted minor tax relief and authorized the Navy to limit crew size, but industry considered these reforms insufficient to begin production. The Labor Ministry decreed a return to work on September 21, and on September 22 all sides agreed to begin fishing. Fishermen and vessel owners agreed not to interfere with production by increasing costs or stopping work. About 80 percent of the fleet was fishing in late September; the rest were getting ready. Crew size remained unchanged. This was not a major issue with producers because the crew's share is the same regardless of size. The Congress is considering further relief.

Industry in Crisis

The fish meal industry has been in crisis since late 1966. Its future is bleak for the remainder of 1967 and far into 1968. Lower world demand and prices for Peruvian fish meal, combined with higher production costs, placed the industry in a financial crisis from which it shows no signs of recovering.

Currency devaluation on September 1 may reduce some local costs--but may greatly increase cost of imported equipment and supplies.

In mid-September, stocks probably were about 350,000 metric tons and sold for future delivery. With future production (October-December) estimated at 200,000 tons a month, and shipments running about 130,000 tons a month, stocks at year end may approach the half-million-ton mark. This would depend on length of shutdowns because of strikes, lockouts, or closed seasons.

The price of fish meal, f.o.b. Peruvian ports, fell early in 1967 to unexpected lows. They remained down until early September, when they were reported to have dropped slightly with expectation that fishing would be resumed soon.

Record First Half Production

In first-half 1967, Peru produced a record 1,029,242 tons of fish meal, despite a four-week closed season and, for the last three months of fishing, a reduction of work week to 5 days. Added to 501,509 tons produced in second-half 1966 (despite 6-week strike), this produced 1966/67 fishing season total of 1,530,751 tons.

It is estimated that production for second-half 1967, during which 1967/68 fishing season will begin, may be over 500,000 tons. This would depend on availability of anchovy, absence of prolonged strikes, lockouts, or new closed seasons.

Peru (Contd.):

In 1966, Peru shipped 1,304,482 metric tons of fish meal. By middle 1967, 750,663 tons had been shipped--slightly better than same date of 1966 but much below the 1965 level. By September 15, 1967, shipments for the year were believed considerably above one million tons.

Venezuela

LEAFLET DISCUSSES
FISHERIES OF VENEZUELA

A new leaflet on Venezuela's fisheries for 1965 and 1966 was issued recently by the U. S. Bureau of Commercial Fisheries (BCF). During these years, 2 of the 3 major commercial fisheries experienced a prolonged severe shortage of their basic raw materials--shrimp and sardines. Shrimp trawlers and lake fishermen turned to finfish, and processing plants were forced to close. Only one shrimp plant experimented with frozen fish fillets (fresh-water catfish steaks) and those were for the U. S. market. The canneries increased slightly their processing of tuna and "pepitones" or turkey wings ("Arca zebra"), but there was no one species available in ample supply to offset the prolonged absence of the sardine.

Editor's Note: In late April 1967, sardines returned to the eastern coast, and by May all canneries were in production. The shrimp reappeared in the Gulf of Venezuela in March 1967, but very few have been located throughout mid-1967 in Lake Maracaibo. No commercial supply of shrimp has been found in Venezuela's eastern waters.

No Sardine Exports In 1966

Short supply of sardines forced Venezuela out of the export market in 1966 because production was required to meet local demand. Japanese importers moved into the shrimp market in April 1967. They continue to buy most of the shipments of the premium grades of pink and brown at prices well above those paid by the U. S. market.

Government Obtains UN Aid

The Government is optimistic over Venezuela's marine resource development potential, but it is concerned over the lack of knowledge of the resources. It has obtained the assistance of the United Nations Special Fund in a project designed to provide the scientific and economic basis for rational development. The five-year project, which should be initiated before the end of the year, will be financed jointly: the Venezuelan Government will contribute some US$4 million and the Special Fund $1 million.

The leaflet discusses Government policy and programs; shrimp, fresh fish, canning, tuna, and fish reduction industries; shellfish other than shrimp, including spiny lobsters. It includes detailed data on landings by species and ports, exports, etc.

Colombia

DEBATE RESUMES ON
200-MILE TERRITORIAL SEA BILL

A motion to begin Senate debate on Colombia's contemplated 200-mile territorial sea was introduced the week of October 8. A bill to extend maritime jurisdiction was introduced in the House of Representatives in February. It passed and went to the Senate. It remained in committee since then.

EUROPE

USSR

TINRO'S DIRECTOR REVIEWS SOVIET PACIFIC FISHERIES

In a recent article, Prof. I. V. Kizevetter, Director of the USSR's Pacific Scientific Research Institute for Fisheries and Oceanography (TINRO), reviewed the Soviet Pacific fisheries. He stated that in 1960 the Far Eastern Fisheries Administration landed only about 800,000 metric tons--but in 1966 the total catch was over 2 million tons (including a small Indian Ocean fishery).

During the current 5-Year Plan (1966-1970), Soviet Far Eastern catches will increase by one-third over 1965, to about 3 million tons. Despite these large increases, the USSR will take, in 1970, only about 8 percent of the total Pacific catch of all nations.

Kizevetter noted the changed species composition of the Soviet landings. New species now caught are: ocean perch, hake, fat herring, saury, tuna, etc. He added: "Intense fishing, conducted by the fishing fleets of Soviet Union and Japan during the last half decade in the Northern Pacific did have an effect on stocks of flounders and ocean perch. In this connection, the problem of unavoidable regulation of this fishery by interested countries has risen."

His Complaints About Soviets' Pacific Fishing

He chided the Far Eastern Fisheries Administration fleet for not doing more deep-water trawling in the "area of the Continental Shelf of the Bering Sea where commercial concentrations of valuable fish species, for example, halibut and sablefish, are available". He complained that "long-lining for cod, halibut, and sablefish has not been given enough attention. He deplored the "weak development of Pacific shrimp fishing" and insufficient use of Alaska pollock, saury, seaweed, etc.

Of Pacific Northwest hake, Kizevetter said it was "an interesting species of our trawl fishing" and that its stocks permit an annual fishery of over 100,000 metric tons.

As for the new Soviet Pacific fisheries, they will be developed in tropical and subtropical zones; pelagic fishing will predominate. The Soviet tuna fishery must be organized so that "the resources will be fully utilized" and the USSR will earn a "leading position in world tuna fishing." In 1966, the Soviets caught only about 6,000 metric tons of tuna--4,400 tons in the Indian Ocean and the balance in the southern Atlantic.

In the tropical eastern Pacific, the Soviets will go after mackerel, sardines, small tuna, sailfishes, swordfish, and pike-mackerel (southeastern Pacific saury).

In the southern Pacific, the expansion will be principally in horse mackerel, tuna, gilt-heads, jacks, various species of perch, red snappers, and others.

* * *

KOSYGIN INSPECTS BALTIC FISHING INDUSTRY

While vacationing in Lithuania, Soviet Prime Minister Kosygin visited the fishing port at Klajpeda. He toured a cannery, a processing mothership, and a large stern factory trawler just returned from the Northwest Atlantic. Kosygin was interested mostly in quality of fishery products and "the life and working conditions of fishermen and their families."

While returning to Moscow, Kosygin also inspected the fishing port at Kalinigrad.

This is twice in as many months that top Soviet administrators paid special attention to the fishing industry. It could be that the poor performance of the Soviet fishing industry under the new economic system ("not production but productivity") is one of the reasons for these visits.

In June 1967, the Soviet Ministry of Fisheries was 9 percent (about 20 million rubles) below the 1967 semiannual "profit" quota. Of 23 other Soviet ministries only that of the meat and milk industries had a poorer "profit" performance (10 percent below the semiannual quota).

USSR (Contd.):

East German source reports that Deputy Prime Minister Novikov visited shipyards at Stralsund where East Germans construct latest series of 3,200-gross-ton stern factory freezer trawlers for the Soviets (over 100 freezer trawlers were ordered in 1965 for 1967-1970 delivery).

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TUNA FACTORY MOTHERSHIP FISHES IN ATLANTIC

In late 1964, the Japanese delivered to Sudoimport, the Soviets' ship-importing firm, a 5,300-gross-ton tuna factory mothership for the Western Fisheries Administration in Riga. The vessel, "Solnechnii Luch" (Sunlight), cost about US$3.6 million. She is 380 feet long, 57 feet wide; her speed is 14 knots and cruising range 120 days. By mid-1965, 5 identical motherships had been delivered. Each carries six 22-ton catcher boats.

The "Solnechnii Luch" departed January 20, 1965, on its maiden voyage from the Far Eastern port of Nakhodka. By the end of February, she was fishing near the Galapagos Islands and along the Mexican and U. S. coasts. She passed through Panama Canal, resupplied at Havana, and then continued towards Brazil. By April 24, she was fishing off the coast of northeastern Brazil, then continued towards west Africa. The last leg of her journey is described by the fishery scientist V. G. Iurov, Atlantic Scientific Research Institute for Fisheries and Oceanography, in the November 1966 issue of "Rybnoe Khoziaistvo."

Iurov wrote that the tuna factory mothership Solnechnii Luch operated along Brazil's northeastern coast from April 24 to May 2, 1965. Adverse weather made launching and hoisting tuna fishing boats very difficult and hampered fishing.

The search for tuna in the region could not be aided by any guiding hydrological factor affecting the distribution of the fish. The sites for the setting of long lines were therefore selected on the basis of non-Soviet statistical data, taking into account changes in the hydrometeorological regime. Five long lines were set radially at 2 to 3 a.m. The catch is tabulated in table.

Catch Mostly Yellowfin Tuna

Most of the catch was yellowfin tuna (40.6 percent) 52 to 155 cm. (20.5-61.0 inches) and 8 to 96 kg. (17.6-211.6 pounds). The average size of male yellowfin tuna gradually increased, reaching 150 cm. (59.1 inches) by end of fishing period (end of April). At that time, the females varied more widely in size--from 127 to 145 cm. The sex ratio in catch averaged 1:1. Most captured specimens were close to spawning. As fishing shifted south, proportion of return spawners and sexually immature individuals decreased; large specimens with almost mature sexual products began to predominate. Tuna feed mainly on squid and small fish. The feeding rate was low.

Other species found were big-eyed tuna, albacore tuna, marlin, spearfish, swordfish, and wahoo. Although bluefin tuna provide the bulk of the winter catch off northeastern Brazil, only one was caught during the entire fishing period.

The Solnechnii Luch operated during May 6-19 in the region of the South Trade Winds. Weather conditions generally were favorable to fishing.

Marlin Found Often

Marlin were found frequently in the central and southern sectors of this region. Yellowfin and big-eyed tuna were caught only in early May, the beginning of the fishing period. Tuna reappeared in the northern part with a commercial school of spawning swordfish.

Catch of Solnechnii Luch, April 24-July 6, 1965

Fishing Region	Total Catch	Composition						Catch Per 100 Hooks	Hooks Cleaned
		Tuna	Sailfish	Shark	Swordfish	Marlin	Mackerel		
	(Metric Tons)							Kg.	No.
N. E. Coast of Brazil	10.74	8.64	1.62	0.48	-	-	-	49.7	21,800
South Trade Winds Current Region	50.06	20.34	0.29	17.04	10.33	2.09	-	97.8	51,700
Sherbro-Conakry Region[1]	274.61	80.25	7.90	168.31	14.68	2.27	1.20	160.0	171,370
Total Catch	335.41	109.23	9.81	185.83	25.01	4.36	1.20		

1/Off the coast of Sierra Leone and Guinea.

USSR (Contd.):

Big-eyed tuna ranged from 100 to 179 cm. (89.4-70.5 inches). Sexually immature fish were not included. Most of the catch were individuals close to spawning.

Swordfish were second in importance to big-eyed tuna. They ranged from 120 to 205 cm. (47.2-80.7 inches). The females were slightly larger than the males. At first the sex ratio was 1:1, but later the proportion of males began to increase. Small numbers of return spawners were found. This indicates that spawning of swordfish is not completed by late May. Both sexes were actively feeding. Large squids, luminous anchovies, and macroplankton were found in their stomachs. Judging from their food, the swordfish inhabited deep waters.

Time of Setting Long Line Important

An important factor in tuna fishing is the time of setting the long line. The fishermen used both the traditional method of throwing the long line at 2-3 a.m., and completing the set at dawn--and a new procedure that markedly increased the catch.

In the new method, the setting began at 4-5 p.m., drifting continued till 9-10 a.m. the following day, and the line was lifted from 9-10 a.m. to 3-4 p.m. The tuna fishing boats using this new method returned to the main vessel after setting long lines equipped with radio buoys. From 6 a.m. the following day, the boats dispersed in the direction of their radio buoys and began hauling. The long lines were fished at dawn and dusk, when tuna bite most avidly. Pacific saury was used as bait. This fish does not lose its palatability even after 14-18 hours in the water. Long-line fishing at night is possible where the danger of sharks eating the catch is not great. (In the case of albacore the long line would be set below 100 meters, 328 feet.)

Fished Sherbro-Conakry Area

From May 23 to July 6, 1965, the Solnechnii Luch operated in the Sherbro-Conakry area (off coast of Sierra Leone and Guinea). There yellowfin tuna formed the bulk of the catch. The average length of male and female was 150-160 cm. (59.1-63.0 inches) and 137-145 cm. (53.9-57.0 inches). These figures varied daily with the arrival or disappearance of groups of small, sexually immature tuna. The stock fished had not reached the spawning stage.

Peak catches (up to 150-200 kg. or 331-441 pounds per 100 hooks) were obtained at the boundary between warm and cold waters.

The general warming of the fishing region due to the northward advance of the Equatorial Countercurrent proceeded irregularly and often was offset by northerly winds. Operations were impeded by constant changes in the oceanologic structure of the region. Small schools of tuna scattered over the whole region often migrated southward because of the northerly winds. The force and duration of the winds determined the extent of these local migrations; usually they did not exceed 30-40 miles. However, this did not affect the seasonal northward migration of tuna, which corresponded with the movement of the boundary between the Equatorial Current and the Canary Current.

Maiden Voyage Data Confirm Earlier Research

The results obtained on the maiden voyage of the Solnechnii Luch in Atlantic tropical waters confirmed the data on spring and summer distribution of tuna stocks established by previous expeditions of the Atlantic Scientific Research Institute of Marine Fisheries and Oceanography.

In late spring, tuna vessels accompanied by an exploratory vessel can operate profitably in the eastern part of the tropical Atlantic--Angola and the open waters of the Gulf of Guinea.

Catches were highly varied: during the first 8 days of fishing, 10.7 metric tons of fish were landed, or 1.3 tons per day; during the next 13 days, 50 tons were landed, giving a daily catch of 3.8 tons; and during the last 44 days off West Africa, 274.6 tons were caught, or over 6 tons per day. The average daily catch per day by long-lining during the 35 fishing days was slightly below 10.0 metric tons. Tuna catches were low--1-2 tons per day (see table).

The Solnechnii Luch returned to Kaliningrad on July 22, 1965, with about 800 metric tons of tuna and other fish. The trip lasted about 180 days; daily catches per trip day were about 4.3 metric tons. Since the vessel carries 180 men, the average catch per crew member was about 24 kilograms per trip day.

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USSR (Contd.):

CONDUCTS FISHERY RESEARCH OFF CALIFORNIA

Early in August, the "Iskatel" (Seeker), a scientific research vessel of the Pacific Institute for Fisheries and Oceanography (TINRO), arrived at Vladivostok after a long cruise off the U. S. west coast. On a previous cruise to the same areas in 1966, Iskatel found large concentrations of sardines, anchovies, and mackerel off California. The 1967 cruise was scheduled to confirm earlier data. It would appear that the Soviets intend to begin a fishery for the 3 species in the near future.

As of mid-September, surveillance flights of the California Fish and Game Commission and other sources indicated no Soviet fishery off California for these species.

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POLAND BUILDS OCEANOGRAPHIC RESEARCH VESSEL FOR USSR

The oceanographic research vessel "Musson" was launched recently at the Warski shipyard at Szczecin, Poland, for delivery to the USSR. The Musson has a displacement of 3,700 tons. She is 86 meters long, and 13.8 meters wide.

The vessel is adapted for fishing in both tropical and subarctic zones. The storage capacity enables her to remain at sea for 90 days and cruise 15,000 nautical miles without calling at a port. A special device designed by the Szczecin shipyard enables the vessel to anchor in ocean depths down to 6,000 meters. She can accommodate 60 scientists and technicians in 23 laboratories equipped with modern instruments. These labs will facilitate oceanographic observations and synoptic research in meteorology measuring direct heating power of sun's rays and soundings of the atmosphere with rockets and radiosonics.

Polish press stressed the expertise needed to construct ships of this kind. The design work was done entirely by Polish technicians and the plans accepted readily by the Soviets. The designers were presented with an award of excellence by the Polish Council of State. (U. S. Embassy, Warsaw, Aug. 25.)

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TINRO STUDIES USE OF SEAWEED

Large beds of sea flax (Phyllospadix) stretch along the Siberian coast not far from Vladivostok and around the southern tip of Sahkalin Island. The Soviet estimate is that up to 10,000 metric tons of dry Phyllospadix could be produced from those beds each year.

Experiments conducted by Pacific Institute for Fisheries and Oceanography (TINRO) technologists have proved fibers of sea flax to be exceptionally strong and able to withstand rot. Further testing will determine if the flax has any practical use.

* * *

COOPERATES WITH JAPAN IN FISHERIES RESEARCH

In recent months the USSR and Japan have exchanged fishery and research teams. On July 20, a Japanese delegation of fishery research scientists from Kushiro (Hokkaido) Salmon Research Institute arrived at the Sakhalin Branch of TINRO (Pacific Ocean Scientific Research Institute of Fisheries and Oceanography) for a week of talks on cooperative salmon programs. On July 23, a Soviet delegation visited the Shimonoseki sea urchin processing factory, fishing port, shipyards, a net factory, and a fish meal plant. In mid-September, 4 Soviet scientists arrived in Japan to participate (aboard a Japanese research vessel) in a 45-day research cruise to study saury resources off Japan. In 1966, a similar joint research project was undertaken aboard a Soviet research vessel. (U. S. Embassy, Tokyo, Sept. 1, and other sources.)

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FISHERY RESEARCH OFF AUSTRALIA

The Soviet research vessel "Lira," TINRO flagship, returned from a 7-month cruise to the South Pacific in early Sept. 1967. Its primary purpose was to investigate the commercial potential of fishery resources in Great Australian Bight during fall and winter. The Soviet scientific party's leader was N. A. Kulikov, a TINRO biologist who used to research Antarctic whales. Soviet sources report the party collected many biologic samples, data on hydrology, and other information that "made the cruise highly successful." This probably means the Far Eastern Fisheries

USSR (Contd.):

Administration wants to begin a large-scale commercial fishery off Australia as soon as possible.

Australian fisheries officials seem to understand this and are concerned over Soviet expansion plans.

Despite the position of provincial fishery officials, Australia does permit Soviet fishery research vessels to come into her ports. ("The Australian Fish Trades Digest," July.)

Denmark

LANDINGS RISE 12 PERCENT IN FIRST-HALF 1967

Landings by Danish fishing craft during January-June 1967 increased about 12 percent above the 1966 period's--from 462,500 metric tons to 520,000 tons. Nearly all categories were up. Exceptions were the cod-like species, eels, and Norway lobster. Catches of herring and brisling were up significantly from the 1966 period. Mackerel catches more than tripled. The supply of pond trout was little changed.

The quantity of processed products--79,000 tons--increased in all categories over 1966 except for fresh and frozen fillets, which declined nearly 15 percent. Both cod and flatfish have been in good supply recently, so the decline in production of fillets indicates a diversion of these fish into sales channels for fresh fish. This diversion further reflects the price decline in western markets for frozen blocks of cod fillets. Among industrial fish products, significantly more fish meal, oil, and solubles were produced than in the 1966 period.

Exports Increase But Value Down

Exports of fishery products increased slightly in quantity but decreased in value compared with January-June 1966. Over 169,000 tons of fishery products worth US$55 million were exported in first-half 1967, compared with 163,000 tons worth $58 million a year earlier.

The major factors behind the decline in value were substantial decreases in value of fillets, fish meal, and fish oil exported. The quantity of fillets exported also decreased. However, quantities of meal and oil increased, and the decline in the value of these exports reflects lower prices in recent months. The quantity and value of pond trout exported were up slightly from the 1966 period. Also, the canned category increased by 20 percent in quantity and 10 percent in value.

Exports to U. S.

Exports to the U. S. during first-half 1967 of about 2,500 tons ($1.8 million) were only about half the 1966 period in value and quantity. Frozen blocks of cod fillets are the predominant export to the U. S. These declined more than 60 percent in quantity and nearly 70 percent in value. Pond trout, the other major frozen export to the U. S., were up substantially in quantity and value.

	Jan.-June		Jan.-Dec.
	1967	1966	1966
	(Metric Tons)		
Fresh and frozen:			
Pond trout	326	189	502
Cod fillets	1,674	4,174	15,372
Flatfish fillets	2	12	163
Other	148	98	808
Total	2,150	4,473	16,845

The important canned items--sprats, herring, shrimp, and mussels--all declined in quantity and value. There were no reports of industrial fishery products exported to the U. S. (U. S. Embassy, Copenhagen, Sept. 1.)

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NEW FISHING PORT OPENS

Denmark's new North Sea fishing port of Hanstholm was opened officially on September 8--50 years after it was conceived.

The new harbor is protected by a breakwater formed of giant precast-concrete caissons. It offers moorage for 200 fishing cutters and will later be expanded to accommodate 400. A large new auction hall provides excellent facilities for selling catches from North Sea fishing grounds. Also, an attractive, modern town has sprung up which will expand rapidly as fishing vessels, processing plants, and supporting activities shift their base of operations to the new harbor. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Sept. 15.)

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Denmark (Contd.):

FISHERMEN MAY USE
MOTHERSHIP OPERATION

A mothership operation may be used this season by Danish fishermen from the port of Esbjerg. Last year they made excellent salmon catches along the North Norwegian coast, but they were not permitted to land their catches in Norway for transshipment to Denmark. The loss of valuable fishing time and increased cost prompted fishermen to negotiate with the owner of a large steel cutter to convert it into a mothership to transport the catches. Salmon fishing in the area was scheduled to begin in September. ("Fiskaren," Aug. 16, U. S. Embassy, Copenhagen, Aug. 25.)

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STEEL VESSELS ARE GALVANIZED

Steel trawlers that have been used in Danish fisheries for some time are being cold-galvanized. If not broken by impact, or removed by abrasion, the galvanized finish is expected to last about 7 years. Molten zinc is sprayed onto the hull using a pressure spraygun-torch apparatus.

As an example, the 180-ton "Signe Anthonisen" was scraped and cold-galvanized for about $2,400 by 4 men in about 6 weeks. In all, 10 steel vessels at Skagen have been galvanized. ("Vestkysten," Sept. 9; Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Sept. 15.)

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DANE ATTEMPTS
MARINE FISH FARMING

A fisherman on the Danish island of Hirtsholm in the Kattegat has stocked 1,200 small plaice in a 1,600-square-meter enclosure of nylon netting. The fish weighed 600 kilograms (1,320 pounds) when stocked and are said to be gaining weight rapidly on two feedings a day of wheat germ.

A biologist of the Danish Institute for Fisheries and Marine Research stated that plaice are not primarily plant-eaters and that the "experiment" was doomed from the very beginning. The fish farmer, ignoring this warning, points out that many fishermen know of particularly fat and tasty plaice caught near shipwrecks containing grain.

Fish farming projects are also underway in the United Kingdom. ("Vestkysten," Aug. 26; U. S. Embassy, Copenhagen, Sept. 15.)

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BEST OYSTER SEASON IN YEARS

Prospects are that 1967 may be the best season for oysters Denmark has experienced in several years. Ideal growth conditions for the shellfish have prevailed this year. Production is expected to be about one million oysters, somewhat more than the harvest in each of the last 5 or 6 years. Landings, however, will not approach the 4 million mark reached several years ago. (Børsen, Aug. 31, U. S. Embassy, Copenhagen, Sept. 15.)

Greenland

SEAL SKIN SALE

At the auction of Greenland seal skins on September 5, 18,055 skins were offered for sale. Nearly 99 percent--17,797--were sold. The auction was held at the Danish Fur Sales, Copenhagen, for the account of the Royal Greenland Trade Department.

Prices were considered fair: skins in the middle-quality grades increased about 15 percent. The price decline evident at the April 12 sale appeared stopped. In April, only 21,039 (78 percent) of 27,279 skins offered were sold.

The next auction of Greenland seal skins will be held in spring 1968 at Danish Fur Sales, 60 Langagervej, Glostrup, Copenhagen. A sale of Greenland fox skins and polar bear skins will be held December 14, 1967, at the same location. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Sept. 20.)

Ireland

$1.1 MILLION FISH MEAL PLANT TO BE BUILT

The Irish fishing industry has received a strong boost from the announcement that a fish meal plant will be built at Burrow Point by Chr. Salvesen & Co. Ltd., of Leith, Scotland. The plant is scheduled to be in operation by next summer. It will have an annual intake of 35,000 metric tons of fish and an output of up to 10,000 tons of meal and oil.

A grant for the £400,000 (US$1.1 million) project has been approved by the Grants Board An Foras Tionscal.

Experienced Company

The company has obtained considerable experience in fish meal and industrial fishing operations. It is constantly looking round the world for suitable fish meal plant locations. The decisive factor in selecting Ireland was the suitable climate for growth in her fishing industry. This potential attracted the Salvesen Company in the first instance.

The plant will be highly automated and have one of the most up-to-date odor-suppression systems.

Boon to East Coast Fishermen

Ireland imports nearly all her requirements of fish meal at an estimated annual cost of £800,000 (US$2.2 million). The new company hopes to produce nearly 10,000 tons of meal and oil yearly, which would require 35,000 tons of industrial fish. This equals Ireland's current landings of food fish. The additional revenue will open a new era for the east coast fishermen supplying the plant. ("The Fishing News," Sept. 8.)

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QUALITY FISH STANDARDS USED FOR FIRST TIME

The first use of Ireland's quality fish standards was recently awarded to a Dublin firm. The standards, oriented towards consumer requirements, are the first standard specifications of their kind for processed fish in Western Europe. Ireland is attempting to make inroads into the world market and is emphasizing quality. She will introduce regulations covering fish handling next Jan. 1.

A license to apply the symbol to a product is granted by the Institute for Industrial Research and standards. A license may be granted only if a specification exists for the product, and the manufacturer has a quality-control system in operation. Adequate records must be maintained by the processor, and the government may make random tests on his product.

Ireland's exports of fishery products showed an impressive 25-percent rise in value last year. Greater potential is there. ("The Irish Skipper," Sept. 1967.)

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TESTS MARINE FISH FARMING

Rearing flatfish under artificial conditions is being tested in Ireland and is encountering difficulties. Sole stocked at Hunterston were of poor quality and hatchery fish mortality was high. But the survivors grew and gained weight throughout the winter. In fall 1966, 50,000 plaice joined the 1965 survivors of the sea-lock enclosure at Ardtoe--and a substantial number survived the winter. The Port Erin hatchery produced 3,000 plaice and 5,000 sole in 1966, instead of the expected 100,000 of each species. Biggest cause of mortality was a change in source of food supply for larvae.

Ireland is well situated to develop fish farms because the many indentations along her coastline are ideal for fish farming. ("The Irish Skipper," Sept. 1967.)

United Kingdom

BLOCKADE BROKEN ON FOREIGN LANDINGS

The partial blockade on foreign cod landings in the United Kingdom fishing port of Grimsby was broken on September 14 when the Belgian trawler "Stella Maris" was unloaded by an association formed by the city's 350 fish dealers. Local trawler owners earlier held control of the unloading apparatus and had been able to limit the unloading of

United Kingdom (Contd.):

foreign vessels. The fish dealers reacted by forming their own association. They say they are prepared to handle any amount of foreign-caught fish. Foreign fishermen were reported extremely enthusiastic about the breaking of the blockade. ("Børsen," Sept. 14; U. S. Embassy, Copenhagen, Sept. 15.)

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EEC REPORTS ON
UNITED KINGDOM MEMBERSHIP

A comprehensive report by the European Economic Commission on October 7 strongly supports opening negotiations for accepting the United Kingdom, Ireland, Denmark, and Norway into the European Economic Community (EEC).

The report presented several obstacles to Britain's membership--most important, the role of the pound sterling as an international reserve. This problem, tied in with balance-of-payment problems, is one Britain believes she has solved by a policy designed to get balance of payments into surplus. Moreover, Britain is willing to discuss any change in international monetary arrangements with the EEC.

Other Obstacles

Other obstacles to British entry are political: (1) she has not broken away sufficiently from U. S.; (2) her joining possibly would weaken Common Market by diluting it into a loose free-trade area; (3) possible adverse effect on East-West negotiations; and (4) present members need more time to consider effects among themselves of Britain's membership.

Britain is hopeful that negotiations, which might begin in November, will be short, quick, and effective. Only full membership interests the United Kingdom, not associate nor probationary membership. ("British Record," Oct. 12.)

Poland

GDANSK BUILDS 50TH
FACTORY STERN TRAWLER

On September 15, State-owned Gdansk shipyards completed their 50th factory stern trawler, the "Perlamuter," ordered by the Soviet import firm Sudoimport of Moscow.

Factory stern trawler, Perlamuter. (Photo: "Polish Maritime News")

Poland began building large factory stern trawlers in late 1958. The first vessels were the B-15 or "Leskov" class, but later they were modernized as the B-26 or "Kosmos" class.

The B-26-class vessels, designed for stern fishing like their predecessors, processed the catch into fish fillets and the offal and incidental catch into fish meal. The fillets are frozen and stored at -25° C. (-13° F.). Frozen whole-fish blocks can also be produced. About 30 metric tons of fish can be frozen daily. The maximum capacity of the fish meal plant is also 30 tons of raw fish per day. In addition, each vessel also has a liver-oil producing plant and a cannery that can pack 200 cans of fish-liver paste daily.

The B-26

B-26-class vessels are 83 meters (272 feet) long and 13.8 meters wide (45.3 feet); their gross tonnage is 2,890 tons. The crew is about 110 persons. A 2,400-hp. main engine can generate a speed of 12.5 knots. An electrically driven trawl winch can pull 12 tons with a rope speed of about 72 meters (236 feet) per minute.

Poland (Contd.):

Much of their machinery is Polish-made, including the fish meal plant and main engine. Previously, the plants were bought from Norway. Radio-navigational equipment is imported from the USSR and the automatic pilot from Denmark.

At present, the Poles are refining the B-26. They have built a prototype of a new class, the B-22, and are fitting it out. The B-22 will be built for the domestic industry. The B-15 and B-26 were constructed mainly for the Soviet Union.

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FISH TUNA FOR FUN

Crews aboard 6 Polish stern trawlers fishing for bottomfish species off the western coast of Africa spend their leisure time angling for tuna. They use natural bait and, apparently, have been successful. During 20 days in February, they landed about 90 metric tons of tuna. ("Polish Maritime News," April.)

Portugal

ESTABLISHES 12-MILE FISHING LIMIT

Portugal's new 12-mile fishing limit prohibits foreign vessels to fish, prepare to fish, or to carry on activities harmful to fishing within these "jurisdictional fishing waters." However, the new law does not prohibit the Government from granting foreign vessels--under terms of conventions, international agreements, or for historical reasons--the right to fish permanently or during a negotiated period in all or part of the jurisdictional waters. But these foreign vessels would be subject to the same regulations and penalties as national vessels.

For violators, the penalties are arrest, detention of vessels with gear and catch, along with varying fines. The measure is applicable to Portugal and to her overseas provinces. (U.S. Embassy, Lisbon, Sept. 31.)

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CANNED FISH PACK ROSE SLIGHTLY IN FIRST-HALF 1967

The Portuguese pack of canned fish in oil or sauce during January-June 1967 was up slightly in weight from the 1966 pack.

	1967		1966	
	Jan.-June		Jan.-June	
	Metric Tons	1,000 Cases,	Metric Tons	1,000 Cases
In oil or sauce:				
Sardines	8,616	453	9,122	480
Chinchards	839	44	248	13
Mackerel	1,282	51	2,074	83
Tuna & tunalike	4,015	134	2,274	76
Anchovy fillets	2,475	248	2,977	298
Others	576	30	508	27
Total	17,803	960	17,203	977

The important sardine pack was down, so was the mackerel pack, but the canned tuna pack increased. ("Conservas de Peixe," August 1967.)

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CANNED FISH EXPORTS DROP

Portugal's exports of canned fish in oil or sauce in January-June 1967 were down about 10 percent from the 1966 period due mainly to lower shipments of mackerel and tuna.

	1967		1966	
	Jan.-June		Jan.-June	
	Metric Tons	1,000 Cases	Metric Tons	1,000 Cases
In oil or sauce:				
Sardines	24,015	1,264	24,052	1,266
Chinchards	219	11	216	11
Mackerel	1,597	64	4,367	175
Tuna & tunalike	626	21	1,462	49
Anchovy fillets	2,270	227	1,958	196
Others	347	18	391	20
Total	29,074	1,605	32,446	1,717

Portugal's principal canned-fish buyers in January-June 1967 were: West Germany, 4,377 tons; France, 3,040 tons; the United Kingdom, 4,303 tons; Italy, 2,284 tons; the U. S., 2,406 tons; and Belgium-Luxembourg 2,544 tons. ("Conservas de Peixe," August 1967.)

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TO BUY JAPANESE SQUID FOR BAIT

A Japanese trading firm recently contracted to export 1,000 metric tons of Hokkaido-produced squid to Portugal. The squid, which will be used as tuna bait, reportedly were sold at between US$170-200 a metric

Portugal (Contd.):

Boxing squid at Choshi (Boso Peninsula near Tokyo).
(Photo: Edelsberg)

ton[1]. In 1966, the Japanese firm won a bid to supply 500 tons of squid to Portugal. ("Suisan Keizai Shimbun," Sept. 12.)

1/Article does not mention whether price is c.i.f. or f.o.b.

Iceland

EXPORTS OF FISHERY PRODUCTS DECLINE

In January-June 1967, Iceland's exports of all major categories of fresh, frozen, and salted fish were lower than the 1966 period. Exports were up slightly for fish meal but down for fish oil. (Icelandic "Statistical Bulletin," Aug. 1967.)

HERRING CATCH DROPS SHARPLY

The herring catch through September 23 was only half last year's production during the same period, despite improved catches in early September.

Herring catches off the southern coast of Iceland were good during the summer and totaled 47,027 tons (42,135 tons in 1966). No herring were caught there after August 18.

For the northeastern herring stocks, the fleet had to operate during August and early September near Jan Mayen and Spitzbergen, 700 to 800 miles from Iceland's shores. The herring caught so far away were unfit for salting when they reached shore and could be used only for oil or meal. In September, however, the herring moved to within 400 miles of the coast. The herring were obliging.

Herring Movement Studied

The movement of herring towards Iceland is followed with considerable interest. Its study is facilitated by the Marine Research Institute's acquisition this summer of an English-built 450 G.R.T. fisheries research vessel, the "Arni Fridriksson." Reportedly, the northern extremity of the herring stock is being extensively fished by the Soviet Union.

Recently, Icelandic ships have been experimenting successfully with onboard salting. Some herring also have been successfully transported under refrigeration for salting

	Sept. 23, 1967	Sept. 23, 1966
	(Metric Tons)	
Salting	1/1,446	2/53,322
Freezing	120	1,698
Reduction	207,653	359,126
Exported on ice	6,650	-
Total	215,859	414,146

1/9,907 barrels.
2/365,221 barrels.

	Jan.-June 1967			Jan.-June 1966		
	Qty.	Value (f.o.b.)		Qty.	Value (f.o.b.)	
	Metric Tons	1,000 Kr.	US$ 1,000	Metric Tons	1,000 Kr.	US$ 1,000
Salted herring	10,683	137,646	3,193	12,098	150,058	3,481
Other salted fish	14,681	280,922	6,517	22,458	432,436	10,033
Stockfish	3,088	94,084	2,183	2,831	90,458	2,099
Herring, frozen	10,656	67,446	1,565	13,443	87,056	2,020
Fish fillets, frozen	16,571	373,501	8,665	20,033	532,814	12,361
Shrimp & lobster, frozen	317	36,924	857	431	44,297	1,028
Fish and whale oil	44,343	274,752	6,374	50,468	400,602	9,294
Fish meal	66,115	424,694	9,853	65,236	499,651	11,592

Note: Values converted at rate of 1 krona equal 2.32 U. S. cents.

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Iceland (Contd.):

in Iceland. Advance sales of salted herring this year are close to 400,000 barrels. It is not certain whether these commitments can be met.

By value, herring were 49.3 percent of 1966 fish exports. The important lag in catch this year is only one of several indications of a significant decrease in value of exports. During first-half 1967, value was 25 percent lower than 1966. (U. S. Embassy, Reykjavik, Sept. 29.)

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FISHERMEN PAY FOR HERRING SEARCH SHIP

A vessel now on its first voyage for the Fisheries Research Institute in Iceland was considered so necessary for finding herring that boat owners and fishermen are paying for it from a voluntary levy. It is the 136-foot "Arni Fridriksson," a herring search vessel and mobile laboratory capable of spending long periods at sea seeking the herring shoals that, in 1966, yielded nearly 680,000 metric tons of fish to Iceland.

The vessel is working northeast of Iceland investigating the disturbing movements of the Atlanto-Scandian herring stocks. These herring are the basis of the summer fishery. They once moved west as far as the northern Icelandic coast but, since about 1960, the shoals have been stopping farther and farther east. This year they also veered north, and Icelandic boats had to travel up to 800 miles to find fish. With the Arni Fridriksson, and a 900-ton ship to be ordered later this year, the research institute in Reykjavik hopes to keep closer track of these movements and find some reasons for them.

The vessel has a length between perpendiculars of 117 ft. 6 in., a moulded breadth of 32 feet, and a moulded depth of 15 feet 6 inches. It is operated by the Lowestoft Laboratory of the Ministry of Agriculture, Fisheries, and Food. ("The Fishing News," Oct. 13.)

Norway

EXPORT TRENDS FOR JANUARY-JUNE 1967

Frozen Fillets: Norwegian exports of frozen fillets in first-half 1967 increased about 7 percent from the 1966 period. Shipments of all major products were up.

Exports of Selected Fishery Products

	Jan.-June	
	1967	1966
	. . . (Metric Tons) . . .	
Frozen fillets:		
Haddock	5,866	5,311
Cod	16,703	16,308
Coalfish	8,806	7,769
Herring	6,919	6,236
Other	3,219	2,995
Total frozen fillets	41,513	38,619
Frozen herring	10,617	9,434
Canned fishery products:		
Brisling	4,257	3,849
Small sild sardines	6,241	5,782
Kippers	1,795	1,643
Shellfish	500	477
Other	2,586	2,418
Total canned fish	15,379	14,169
Fish meal	226,759	118,662
Herring oil, crude	25,608	22,831

Canned Fish: In early 1967, exports of canned brisling ran somewhat behind the previous year when shipments were exceptionally high, but 1967 shipments through June were ahead of the year-earlier totals. Exports of small sild sardines were up about 8 percent. The main canning season for brisling and sild sardines begins in the spring.

Industrial Fish: Exports of fish meal in Jan.-June 1967 were up 90 percent from the 1966 period. The large stocks on hand at the start of 1967 contributed to the gain. Landings of fish for industrial purposes continued at a high level in early 1967. Fish meal output ran slightly ahead of the first half of 1966. The gain was due to larger landings of capelin and mackerel. ("Fiskets Gang," July 6 and 27.)

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CATCH OF HERRING IN NORTH SEA TO STABILIZE

Norway's North Sea herring catch is likely to stabilize at 700,000 to 800,000 metric tons a year, according to a Norwegian marine biologist. During 1950-1963, the catch of all nations averaged 700,000 tons annually. By 1965,

Norway (Contd.):

the total catch had risen to 1.3 million tons, with Norway taking about half. In 1966, production dropped 30 percent from 1965; catch per unit of effort also decreased, from 2,000 to 1,300 tons. Norway hopes to continue taking about 50 percent of the catch.

Only 13 Norwegian purse seiners participated in the fishery in 1963--and over 300 in 1966. If profits decline, the fleet could shift to other grounds or fish herring for human consumption (present catch is used only for meal production).

Overfishing May Become Problem

Overfishing may become a problem, however, because the factors affecting herring year-class strength are little known. There is no clear evidence that stock size and recruitment are related. Increased fishing may decimate the stock so that recruitment will be diminished. Overfishing will be indicated if the total catch for some years drops below 700,000 tons. If this happens, regulatory measures will be necessary. (Regional Fisheries Attaché, U. S. Embassy, Copenhagen, Sept. 8.)

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ONLY ONE EXPEDITION SLATED FOR ANTARCTIC WHALING

Norway will use only one expedition in the 1967/68 Antarctic whaling season because of her reduced share of the international whaling quota. During the last 2 seasons, the Norwegians were assisted by 5 Japanese catcher boats in an agreement with a Japanese company that included selling the whale meat to Japan. That contract was cancelled this season, partly because of oversupply of whale meat in Japan. All whale meat to be produced this season by "Kosmos IV" has been sold to European buyers. (U. S. Embassy, Oslo, Sept. 21.)

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NEW MARKETING ORGANIZATION FORMED

A new Norwegian marketing organization, the Nordic Group A/L, was formed by 14 independent producers of frozen fish fillets. The group, which begins operations this fall, emphasizes the U. S. market.

A press release said the new export organization was motivated by an offer of the Ministry of Fisheries to extend general export rights to all markets except Eastern Europe to the 14 firms if they established a joint export organization.

Since 1955, the Ministry of Fisheries has centralized exports of frozen fish fillets to most significant markets: All Eastern European countries, Sweden, Denmark (for frozen saithe fillets only), France, Belgium, the Netherlands, Switzerland, Austria, Israel, the U. S., Canada, and Australia. Exclusive export rights to these markets have been granted to Norsk Frossenfisk A/L (Frionor), a voluntary combine of 120 companies, and A/S Findus, a subsidiary of Nestle and the single largest company in Norway's fish processing industry. Frionor's export rights cover all the above markets, but Findus' are confined to markets in Western Europe.

The 14 Had Other Markets

The 14 firms withstood all efforts by Frionor, fishermen's organizations, and the authorities over the years to join the Frionor group. They contented themselves with exports to other markets (the most important are Great Britain, West Germany, and Finland) and occasional export licenses for shipments to France and the U. S. Despite these limitations, the 14 independents were quite successful. In 1966, their joint exports were 11,000 metric tons of frozen fish fillets, or more than 16 percent of Norway's total exports of such products. Their 1967 exports are estimated at more than 20 percent of the total.

The initiative of the Ministry of Fisheries has been severely criticized in fisheries circles, particularly by the Frionor group and Norges Faafisklag, the marketing organization handling the bulk of first-hand sales of fish for filleting purposes. The critics particularly stress that the new markets for Norwegian frozen fish fillets, which will be opened for the Nordic Group, have been developed at great cost by Frionor; also, that Nordic will reap gains at Frionor's expense. Frionor will futher have to bear the burden of supplying the reportedly less profitable Eastern European markets.

Nordic Will Get Export Rights

Despite these objections, it is believed the Nordic Group will be granted their new export rights. This is mainly because the Ministry of Fisheries offer has a rider stating that all frozen fish fillet export markets will be reserved by the Ministry for Frionor and Nordic, but with no infringement on the current rights of Findus. Norges Raafisklag, a very

Norway (Contd.):

influential element in fisheries policy, has strongly advocated for many years that individual companies should be denied access to frozen fish fillet export markets because of alleged adverse effects on exports of such products (competitive price-cutting, products uneven in quality, etc.). Although the Ministry's proposal does not meet another "desideratum" of Raafisklaget in this matter--exclusive export rights for Frionor--it will probably be accepted as a step in the right direction.

It seems too early to form any well-founded opinion on the possible impact on the U. S. frozen fish fillet market of the Nordic Group's planned sales drive. According to Nordic's press release, some member companies are already represented in the U. S. for other fish products and seem optimistic about marketing their frozen fish fillet also. However, Norwegian frozen fish fillets have not done too well in the U. S. lately. During the first seven months of 1967, Norway's exports of such products were 3,691 metric tons, or 24 percent less than during the 1966 period. (U. S. Embassy, Oslo, Sept. 28.)

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REPORT ON NORWAY'S FISHING INDUSTRY

The season for brisling reopened on July 20 and sufficient quantities were caught in seines by August 10 to cover industry needs for this season. Brisling caught after August 10 was to be used for reduction.

Most factories resumed work at the end of July or early August. Packing continued at full capacity, especially with brisling, but partly with sild sardines. During first-half 1967, about 1 million cases of 100 quarter cans per 25-lb. case, or about 25 million lbs. of sardines, kippered herring, and soft herring roes had been produced. This was achieved despite difficulties with raw material, working conditions, closed season, and many spring holidays. There is a fair possibility that industry in 1967 may produce more of its main products than the 1.9 million cases (in quarter cans) during 1966.

Exports Exceed Production

Production is increasing, but it will be difficult to produce surplus stocks. Stocks of sild sardines in 1966 were much too small; now they are increasing slowly to a fair level. Since Jan. 1, exports have been 10 percent greater than production.

The export of sild sardines has exceeded this year's pack. This, plus domestic sales, has reduced stocks since beginning of 1967. Brisling exports in early September were about 40,000 cases behind last year's figures, but stocks remain low. The main reason for lower exports is the continued reduction in deliveries to England. Exports and stocks of kippered herring are about the same as last year; the same applies to stocks of soft herring roe. ("Tidsskrift for Hermetikindustri," Norwegian Canners Export Journal, Sept. 1967.)

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NORWAY EXPORTS 13 DEEP-SEA VESSELS TO ICELAND

The largest shipyard in northern Norway has delivered, or has contracted for, 13 deep-sea fishing vessels for Icelandic owners. The 13 are worth 30 million Norwegian kroner (about US$4 million). They are an interesting example of exports Norway has developed in this field in recent years.

The entire production of the Norwegian shipyard is characterized by serial production. Since the first fishing vessels were delivered in 1958, the shipyard has concentrated on the same specialized basic designs.

First Purse Seiner With 3 Propellers

In 1964, the shipyard delivered the world's first purse seiner fitted out with 3 propellers. This feature previously had been reserved for ferryboats and vessels in line service--to improve maneuverability in foul waters and during difficult weather conditions. The shipyard tested this system's advantages on a vessel delivered to Iceland in 1964. It proved so successful that it became a feature of many vessels built for Norwegian and Icelandic owners.

Building capacity has been exploited to the limit in recent years. Demand has exceeded capacity. To meet Icelandic demand, some operations have been transferred to subcontractors. ("Norwegian Fishing and Maritime News," No. 3, 1967.)

Harvesting seaweed at Shirahama, South of Tokyo. (Photo: E. Edelsberg)

ASIA

Japan

1967 MOTHERSHIP-TYPE SALMON FISHERY SUCCEEDS EARLY

The 1967 Japanese North Pacific mothership-type salmon fishery began on May 20 in Area A (north of 45° N. latitude) and all fleets (11 motherships accompanied by 369 catcher vessels) attained their catch targets by July 15--ahead of schedule. Total production was 42,635 metric tons, averaging 115.5 tons per catcher vessel. Compared with 1966, the 1967 fleet quota was 3,654 tons higher, averaging about 10 tons more per catcher vessel.

Catch composition was 40 percent red, 33 percent chum, 25 percent pink, and 2 percent silver and king. In 1966, landings were 40.3 percent red, 47 percent chum, 8.4 percent pink, and 4.3 percent silver and king. The poor catch of Bristol Bay red salmon was offset by the good harvest of Asian reds.

Asian Stocks Stabilized

The goals were reached early primarily because Asian salmon stocks had stabilized. Good weather and favorable ocean conditions also contributed. An abundance of salmon harvestable in 1968 was observed. This raised hopes in the salmon industry for another good year, although 1968 will be a poor pink year.

All 11 fleets began operations in the central fishing grounds between 165° E.-170° E. longitudes and 46° N.-48° N. latitudes. From late May to June, 3 fleets shifted operations eastward seeking Bristol Bay red. They were joined by another fleet. Later, 2 of the remaining fleets moved southwest of Attu Island.

From late June until July, 8 fleets deployed in the Olyutorski region. One fleet moved into the silver salmon grounds at 170° E.-175° E. longitudes and 46° N.-47° N. latitudes. The fleet in the central fishing grounds moved northwest off Cape Kozlova. The fleets fished in these positions until they reached catch targets.

Salmon In Wide Area

The 1967 mothership-type salmon fishery was characterized by the occurrence of salmon of all species over a wide area. This enabled fleets to disperse. Fishing had to be suspended 2-6 days because of fleet movements, and 3-4 days due to bad weather.

The land-based, gill-net fleet in Area A, and gill-net and long-line fleets in Area B (south of 45° N. latitude) attained their respective catch quotas of 9,865 metric tons and 55,500 metric tons. They ended operations on June 23, also ahead of schedule. Land-based gill-net catches were predominantly chum and red, but sizable quantities of Asian pink were taken by the long-line fishery. ("Nihon Suisan Shimbun," September 6 & 9.)

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TUNA FLEET IN ATLANTIC DECREASES

The Japanese Atlantic tuna fleet, which several years ago totaled over 150 vessels during peak periods, has declined sharply. In August 1967, it had only 39 vessels. The decline, despite higher catch rates in the Atlantic than in the Pacific and Indian Oceans, is attributed to greater efforts of fishing firms to improve the freezing facilities of their vessels rather than enlarge their fleets.

Operators of large vessels are reported competing to install better freezing equipment to quick-freeze at -40° C. (-40° F.) temperatures. This would improve the keeping quality of the catch--and fish with good color and texture bring much higher prices on the domestic fresh-fish market.

1 Trip A Year

These large, better-equipped vessels have reduced their Atlantic operations to about one trip per year. Now only about three 1,000-ton vessels operate there regularly. The rest of the fleet is mostly smaller long-liners in the 200- to 500-ton class.

Atlantic fishing is concentrated in 3 areas: albacore off Saint Martin Island (east of Puerto Rico) and Angola, and yellowfin off the Ivory Coast. Fishing is reported good. Daily catches per vessel average 3.5-4 metric tons. ("Suisan Tsushin," Sept. 6.)

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Japan (Contd.):

SURVEY OF EASTERN ATLANTIC TUNA RESOURCES IS SCHEDULED

The Japanese Government has commissioned the 416-gross-ton fishery training vessel "Shin Miyagi Maru," owned by the Miyagi Prefectural Government, to conduct a tuna resource survey in the Atlantic Ocean for one year beginning in November. The purpose is to gain a better knowledge of the actual condition of Atlantic tuna resources. This would strengthen Japan's position of leadership in the International Convention for the Conservation of Atlantic Tunas, expected to go into effect shortly.

South of Equator In 1967

The Shin Miyagi Maru was scheduled to depart Japan in early October and proceed directly to Cape Town, Union of South Africa. From there she will begin surveying equatorial Atlantic off the Africa coast from early November 1967. She will explore south of the equator from 0°-45° S. latitudes in 1967, and north from 0°-45° N. latitudes in 1968. The vessel is equipped with the latest scientific instruments for collecting oceanographic and biological data about the tunas. ("Suisan Keizai Shimbun," Sept. 18.)

* * *

MINCED FISH MEAT PRODUCTION INCREASES

Japan's annual production of minced fish meat (ingredient for fish sausages and cakes) continues to rise. Undertaken experimentally in 1965, production has been spurred by the rising sales of fish cakes. The fish-cake industry produced 270,000 metric tons in 1966. It is experiencing a "silent boom," with consumption jumping at least 10 percent since 1963.

In 1967, minced meat production will reach 68,000 metric tons, a 50-percent over 1966. The minced meat is prepared mainly from Alaska pollock, mackerel, and flatfish. It is produced by factoryships in the Bering Sea and North Pacific, Hokkaido land-based processors, and Isei (China Sea west of 128° E. long.) fishery operators.

Producer's prices are quoted at about US$340 a short ton for factoryship products, $315 a short ton for minced Alaska pollock,

Produced by	Production		
	1965	1966	1967 (Est.)
	(Metric Tons)		
Factoryship	6,900	13,700	30,000
Hokkaido	23,500	25,000	28,000
Isei fishery	5,000	7,000	10,000
Total	35,400	45,700	68,000

and $454 a short ton for minced flatfish processed in Hokkaido. ("Suisan Tsushin," Sept. 5, & "Nihon Suisan Shimbun," Sept. 4.)

* * *

PLANS LARGE PROGRAM OF RESOURCE DEVELOPMENT

The Japanese Fisheries Agency has submitted to the Finance Ministry a preliminary budget request totaling about US$97.9 million for fiscal year 1968 (April 1968-March 1969). This is a 30-percent increase over the FY 1967 fishery budget of $74 million.

For FY 1968 programs, much importance is attached to high-seas fishery resource investigations. The Agency is requesting $3.08 million for these, more than ten times the $237,475 appropriated in FY 1967.

For tuna resource development, the Agency has developed the following 5-year plan: first and second year--survey the South Pacific Ocean between 170° W.-90° W. longitudes and 40° S.-56° S. latitudes (south of Samoa to the coast of Chile); third year--explore areas south of Alaska; fourth and fifth years--survey the South Atlantic Ocean off Argentina ("Katsuro-maguro Tsushin," Sept. 8, and other sources.)

* * *

MORE VESSELS ARE USING AUTO REEL

About 150 government and industry members attended a meeting in Tokyo on September 4 to evaluate the performance of the long-line "auto reel" device. The device mechanizes long-line setting and retrieving--thereby reducing the need for labor by about 6 men per vessel. The meeting was sponsored by the Japan Federation of Tuna Fishery Research Society. The participants noted steady progress in the use of this gear.

The auto reel, developed over a year ago, has been installed on about 50 tuna vessels. Another 20 plan to adopt it shortly. Two problems discussed were: crews were not yet fully

Japan (Contd.):

accustomed to using the equipment--and vessels suitable for this gear must be at least 200 gross tons. However, because the auto reel reduces manpower requirements substantially, the Fisheries Agency intends to encourage its adoption by the tuna fishing industry. ("Suisan Keizai Shimbun," September 6.)

* * *

WHALE OIL PRICE IS UP

In early July, 1,400 metric tons of finback oil produced in the North Pacific were sold to independent companies in Europe at US$173 per ton c.i.f. for delivery in Rotterdam October and November. At the same time, 4,300 tons of oil were sold for domestic use at $178 per ton. This is the first contract for export and domestic sales of North Pacific whale oil.

The sale of 34,000 tons of finback whale oil in March to a Dutch firm included unsold stocks from the North Pacific and the Antarctic whaling seasons. The price was $166 per ton c.i.f. Thus, even oil produced during the Antarctic whaling season was sold at a very low price. (The 1966 price was $258.)

The contract price with independent firms is now only a little higher than that offered the Dutch firm this spring. However, since no Dutch offer has been received, it is assumed some time will pass before the next contract is concluded. For the present, the export price for finback whale oil will be $166 to $173. (Fishery Attaché, U. S. Embassy, Tokyo, Aug. 9.)

* * *

FROZEN SHRIMP IMPORTS ARE UP

Japanese imports of frozen shrimp in August 1967 totaled 3,908 metric tons worth about US$5.9 million on a customs-clearance basis. Imports from the Soviet Union were the largest by far, totaling 1,407 tons of red shrimp. Other leading suppliers were Thailand, 488 tons; Mexico, 446 tons; and Australia, 247 tons.

Imports during January-August 1967 totaled 28,713 tons, compared with 24,708 tons for the 1966 period. Imports from Communist China during January-August 1967 declined over 50 percent from the 1966 period,

Imports of Frozen Shrimp, Jan.-Aug. 1967

	Quantity Imported		
	Aug.	Jan.-Aug.	
	1967	1967	1966
	(Metric Tons)		
Soviet Union	1,407	8,831	6,001
Mexico	446	5,050	3,194
Communist China	186	3,559	7,843
Thailand	488	3,329	2,171
Hong Kong	168	1,839	193
India	166	819	651
Sabah (N. Borneo)	163	723	503
Saudi Arabia	-	620	125
Australia	247	609	388
South Korea	40	560	550
Formosa	57	474	-
Others	540	2,300	3,089
Total	3,908	28,713	24,708

while purchases from Mexico and the Soviet Union increased by more than 60 percent and 16 percent. ("Suisan Keizai Shimbun," September 19.)

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TUNA LANDINGS AT YAIZU DECLINE

August 1967 fish landings at the Japanese port of Yaizu totaled 8,526 metric tons worth about US$4 million, down 26 percent in quantity and 14 percent in value from the 1966 period, according to the Yaizu Fishery Cooperative Association.

August 1967 Landings and Average Exvessel Prices

Product	Quantity			Avg. Price		
	1967	1966		1967	1966	
	Aug.	July	Aug.	Aug.	July	Aug.
	(Metric Tons)			(US$/Short Ton)		
Tuna:						
Bluefin[1]	3,787	3,454	6,149	625	573	479
Albacore	670	697	753	461	455	428
Skipjack	2,810	6,154	3,711	247	237	192
Mackerel	451	143	119	108	129	83
Others	808	531	713	-	-	-
Total	8,526	10,979	11,445			

1/Includes yellowfin and big-eyed tuna.

Compared with July, landings were down by 2,453 tons or 22 percent. The decline is attributed to poor fishing in both the bait-boat and long-line tuna fisheries. ("Nihon Suisan Shimbun," Sept. 16.)

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FROZEN TUNA EXPORT PRICES RISE

Frozen tuna exports direct from Japan to the U. S. during April-August 1967 were

Japan (Contd.):

17,288 short tons--albacore, 11,564 tons, and yellowfin, 5,724 tons--according to the Japan Frozen Tuna Producers Association.

August 1967 Frozen Tuna Export Prices for Direct Shipments

Product	Export Price, f.o.b. Japan					
	High		Low		Average	
	1967	1966	1967	1966	1967	1966
	(US$/Short Ton)					
Albacore, round	493	450	450	430	472	438
Yellowfin, gilled & gutted	418	395	378	325	397	385
Albacore loins	990	943	840	917	948	933
Yellowfin loins	900	791	893	785	897	787

Tuna loin exports to the U. S. and Canada during the same period were 594 tons. Frozen tuna export prices for August were up. ("Suisancho Nippo," October 2.)

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CANNED TUNA EXPORT PRICE MAY RISE

The Japanese Canned Tuna Sales Company heard a report on September 18 from its 3-man survey team just returned from a 3-week trip to the U. S. It also discussed plans to raise canned tuna prices from October.

The purpose of the U. S. tour was to survey actual market conditions there before carrying out any price changes. Details of the survey report are not yet available, but it appears that discussion based on that report favored a substantial price increase. This could be between US$1-1.50 a case (7 oz. 48's) for canned whitemeat tuna in brine.

Canned Tuna Holdings

The Sales Company's inventory of canned whitemeat tuna in brine is practically exhausted. Holdings at the packers level are estimated to be 500,000 cases, which include about 300,000 cases of 4-lb. 6's. The Sales Company's holdings of canned lightmeat tuna in brine are reported to be about 140,000 cases. Export of canned lightmeat tuna is stagnant due to slow movement on the U. S. market, where it is being outsold by the U. S. pack. ("Kanzume Nippo," Sept. 20, "Nihon Suisan Shimbun," Sept. 15.)

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TUNA CANNERS ARE SHORT OF RAW FISH

Japanese tuna packers in Shizuoka, near the tuna Port of Yaizu, who switched from fruit canning to tuna packing in September, were operating under extremely difficult conditions: they were short of raw tuna. The recent decline in tuna landings at the two major fishing ports in Shizuoka Prefecture compelled most tuna packers, primarily putting up canned tuna in oil, to sharply reduce operations. Moreover, the high cost of raw material, averaging about US$252 a short ton for skipjack, is said to allow packers little or no margin of profit. ("Kanzume Nippo," September 29.)

* * *

PRICES RISE ON CANNED-IN-BRINE TUNA FOR EXPORT

The directors of the Japan Tuna Packers Association, at their September 27 meeting, raised prices for canned tuna in brine exports to the U. S., effective October 1. For both whitemeat and lightmeat tuna, price increases on 7-oz. 48's were highest--US$1 per case for whitemeat and 50¢ per case for lightmeat. The lower net increase for the canned lightmeat tuna was due to slow sales on the U. S. market. ("Suisan Keizai Shimbun," Oct. 2, and other sources.)

Canned Tuna in Brine Export Prices, Effective October 1

Can Size & No. Cans	New Price	Old Price	Net Increase	Price at Beginning of FY 1967 (Apr. 1967)
	(F.o.b. US$/Case)			
Whitemeat solid:				
7-oz. 48's	11.20	10.20	1.00	11.50
13-oz. 24's	10.50	10.00	.50	10.80
66½-oz. 6's	12.25	11.65	.60	12.65
3½-oz. 48's	6.70	6.60	.10	6.90
6½-oz. 48's	8.20	8.00	.20	8.45
Lightmeat solid:				
7-oz. 48's	8.70	8.15	.50	9.15
13-oz. 24's	8.00	7.80	.20	8.60
66½-oz. 6's	9.55	9.40	.15	10.40
3½-oz. 48's	5.20	5.10	.10	5.80

* * *

FISHING HAKE OFF U. S. PACIFIC NORTHWEST

The Japanese factoryship "Hoyo Maru No. 2" (3,456 gross tons) owned by Hokuyo Suisan, which began fishing experimentally for hake

Japan (Contd.):

off Vancouver Island from September 19 with three 250-gross-ton trawlers, took 485 metric tons of fish (70 percent hake and 30 percent rockfish) in 13 days. The catch was processed into minced fish meat and fish meal. The fleet's production was reported running behind schedule due to loss of fishing time caused by collision between 2 accompanying trawlers.

Second Fleet Fishing

The second fleet to participate in the Pacific northwest fishing departed Japan on October 3. It consisted of mothership "Kashima Maru" (7,163 gross tons) accompanied by 8 trawlers. It is assigned a target of 35,000 tons of hake and 5,500 tons of other bottomfish. ("Suisancho Nippo," Oct. 2 & 4.)

South Korea

SOUTH KOREA-JAPAN MINISTERIAL TALKS INCLUDE FISHERY PROBLEMS

A 3-day Ministerial Conference between Japan and South Korea in Tokyo, which ended on August 11, paid much attention to fishery relations. Directors of both nations' fisheries agencies participated. The most important statement in the joint communique was that a Japanese loan of US$50 million, put up by private firms, would be made to joint fishery ventures and foreign markets. A Japanese newspaper reported that this announcement stimulated much interest in Japan, especially in the tuna industry. There, the use of South Korean labor could substantially reduce production costs and alleviate the acute labor shortage in its distant-water fisheries.

The 2 nations also agreed on joint development of South Korea's coastal marine fish culture if the products do not compete with Japanese products. The Japanese negotiators stated that their recently passed "Law to Control Foreign Fishery Firms" was not intended to prevent Korean fishing vessels calling at their ports.

Agreements Incomplete

Complete agreement was not reached on approval of Japanese exports for the Korean shipbuilding industry. Private Japanese firms apparently offered Korea another US$30 million loan to buy Japanese-built fishing vessels. The Koreans are trying to develop low-cost domestic shipbuilding and find Japanese vessel prices extremely high. They "strongly requested" that part of the $30 million be used for exports not only of vessels--but of construction materials and machinery to help build fishing vessels more cheaply in Korea. The Japanese, however, were noncommital and promised only "to study the matter."

Total Japanese private credits of US$90 million for South Korean fisheries developments also were confirmed. (Joint Communique of Japan-Republic of Korea 1967 Ministerial Conference, and "Suisan Keizai Shimbun," Aug. 24.)

North Korea

ORDERS 2 LARGE FISH-PROCESSING VESSELS FROM NETHERLANDS

A North Korean state-owned firm has placed a US$13.8-million order with the Verolme United Shipyards of Rotterdam to construct 2 fish-processing vessels. The 7,050-gross-ton vessels will be capable of processing 125 metric tons of fish a day. Their daily freezing capacity of 180 tons reportedly is the world's largest. Each vessel will be equipped with a 5,500-hp. main engine and have a crew of about 250. Negotiations to construct 2 more similar vessels are still in progress. (U. S. Embassy, the Hague, Sept. 12.)

Third Fish-Processing Vessel

This is the third fish-processing vessel North Korea has bought from the Netherlands. In January 1965, a 7,200-gross-ton vessel was delivered by the same shipyards. The "Top Van Witte Berg" has a 120-metric-ton daily processing capacity. It was used in the herring, flatfish, and Alaska pollock fisheries in the Sea of Okhotsk.

In 1966, North Korea concluded a fisheries cooperation agreement with the USSR soon after Soviet Fisheries Minister Ishkov visited. North Korean fishermen and technicians train on Soviet fishing and support vessel operating out of Far Eastern ports.

India

FISHERY EXPORT CRISIS APPROACHES

A near crisis is developing in India's exports of marine products. It is attributed largely to (a) shortage of available raw shrimp, until now believed abundant along Kerala coast; (b) a combination of spiraling domestic prices motivated by increased rupee earnings as a result of rupee's devaluation in June 1966, coupled with higher living costs; and (c) bumper catches in Mexico and the U. S. stiffened competition with Indian products and forced prices down, reportedly 40-50 percent.

It is reported that in late August a few firms in and around Ernakulam-Cochin in Kerala State had ceased canning and freezing operations, while others were using only part of plant capacity. Processors and exporters have urged the Government to restore the former incentive schemes to enable the marine foods industry to withstand the crisis.

Exports Rose In Past Few Years

Exports of marine products have increased in the past several years in quantity and value. Exports of nearly 12,000 metric tons worth rupees 37.4 million (US$7.8 million) in 1962 rose to the peak of over 19,000 tons valued at rupees 135.2 million ($18 million) in 1966. A further stimulus was provided by devaluation of the rupee with exports totaling 21,100 tons valued at rupees 173.7 million ($23.1 million) in 1966/67. This was a 38-percent increase in quantity (over 15,300 tons worth rupees 70.6 million or $14.8 million) exported in 1965/66.

Officials of the Marine Products Export Promotion Council in Ernakulam, Kerala State, had said after rupee devaluation in June 1966 that their problem lay in locating and catching sufficient supplies of shrimp to satisfy increasing U. S. demands. However, recent discussions with Indian officials have revealed the developing crisis resulting from reduced catches, rising local prices, and growing competition from foreign countries. (U. S. Consulate, Madras, Aug. 30.)

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SYMPOSIUM ON MOLLUSCA

A Symposium on Mollusca is scheduled by the Marine Biological Association of India for Jan. 12-16, 1968, in Cochin/Ernakulam. Subjects to be discussed: Taxonomy, Phylogeny and Evolution, Distribution, Morphology and Anatomy, General Biology, Radiation Biology, Reproduction, Early Development, Ecology and Behavior, Physiology, Boring and Fouling Molluscs, Parasitism and Commensalism, Culture, Economics and Fishery.

This is the third Association-sponsored symposium. The first, in 1962, dealt with Scombroid Fishes; the second, on Crustacea, was held in 1965.

Ceylon

LARGE-SCALE TUNA FISHING PLANNED

On its maiden fishing voyage in September the Ceylonese tuna vessel "Kalmunai" unloaded its catch of 85 metric tons of tuna and marlin at Penang, Malaysia, for processing by a joint Japanese-Malaysian company. Three Japanese experts assisted the Kalmunai's crew.

The vessel is one of two tuna vessels recently purchased by the Ceylon Fisheries Corporation. It spent the summer fishing in the Indian Ocean. The other vessel, the "Mirissa," was fishing in the same area in September.

The processors are the Malayan Marine Industries, Ltd., in Penang, They also process Japanese and Taiwanese catches for export to the U. S., Britain, and Italy.

The Ceylon Government plans to embark soon on large-scale tuna fishing. ("Fishing News International," Sept.).

SOUTH PACIFIC

Australia

FISHERY EXPORTS ARE UP

Australian exports of marine products rose about US$928,000 to a record $30.7 million in 1966/67 (July-June 30), according to the Commonwealth Bureau of Census and Statistics.

A drop of $1.6 million in value of spiny lobster tail and whole spiny lobster exports was offset by increases of $747,000 in value of shrimp exports, $722,000 in scallop exports, and $1.1 million in canned and frozen abalone shipments.

Exports	1966/67		1965/66	
	1,000 Lbs.	US$ 1,000	1,000 Lbs.	US$ 1,000
Spiny lobster tails	10,312	18,929	9,735	19,887
Whole spiny lobster	1,339	1,402	2,037	2,107
Shrimp	2,556	2,785	2,169	2,037
Scallop	2,488	1,659	1,791	936
Frozen abalone	765	424	498	285
Other crustaceans and molluscs	151	61	130	80
Tuna	832	164	4,783	828
Other fish	149	65	74	32
Canned abalone	2,195	1,349	708	370
Canned fish, crustacea and molluscs	752	402	453	239
Total edible	21,539	27,240	22,378	26,801
Pearls	-	2,139	-	1,716
Shell	12	609	11	480
Other	156	153	72	49
	Gals.		Gals.	
Whale oil	1,118	512	1,546	1/692
Grand total		30,653		29,738

1/Includes $9,900 worth of whale meat, meal, and solubles.

Exports of edibles--fish, crustacean, and molluscs--were worth $27.2 million, compared with $26.8 million in 1965/66.

Lobster tail exports increased by 577,000 lbs., but value fell $958,000. The weight of whole spiny lobster exported fell 698,000 lbs. and the value $705,000.

Of edible products, exports of whale products fell, but cultured pearl exports were valued at nearly $2.2 million, up about $440,000 over the previous year. ("Australian Fisheries Newsletter," September.)

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EXPORTS OF SPINY LOBSTER TAILS DECLINE

Australian exports of frozen spiny lobster tails for the 9-month period ended March 31, 1967, totaled 7.3 million lbs. and were worth US$12.6 million. This was a drop of 6.4 percent in quantity and 15 percent in value compared with the 1965/66 period.

Exports from 5 states were: Western Australia, 5.3 million lbs. (2 percent more than 1965/66 period); Victoria, 1 million lbs. (up 1 percent); South Australia, 600,000 lbs. (down 30 percent); Tasmania, 400,000 lbs. (down 20 percent); and New South Wales 100,000 lbs. (down 50 percent). ("Australian Fisheries Newsletter," June.)

New Zealand

JAPANESE SHOW LITTLE INTEREST IN JOINT TUNA VENTURE

New Zealand's proposal for a joint tuna venture with Japan was revealed by the Executive Secretary, Fishing Industry Board, who visited Japan recently to discuss cooperative fishing, gear purchase, and trade. The proposed venture reportedly has not been received enthusiastically by the Japanese industry since it calls for delivering only such tuna species as yellowfin and albacore to New Zealand packers.

Japanese vessel owners claim they cannot make profits unloading only part of their catches in New Zealand because this would damage other fish in the holds. Tuna catches off New Zealand are predominantly bluefin which, in good condition, bring better prices on the Japanese fresh-fish market, so vessel owners prefer bringing their catches home. The prospects for a joint venture are dim. ("Suisan Keizai Shimbun," Sept. 15.)

AFRICA

South Africa

SHIPS WHALE MEAT TO JAPAN

The first shipment of whale meat from South Africa was exported to Japan recently. This represents an important new export market for the fishing industry.

World production of whale meat is about 150,000 metric tons a year. Most of it is consumed in Japan, although it is also popular in many other countries, including Norway.

The South African whaling company, whose fleet of catchers operates up to 200 miles off the Durban coast, planned to produce 2,000 tons of whale meat during the current whaling season (February to September). The company also is introducing whale meat to the local market. The two main types of edible whale in great demand by consumers are the sei and the fin. ("South African Digest," Sept. 22.)

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SHOAL FISH CATCH CONTINUES UP

The Cape west coast shoal fish catch in the first six months of 1967 was 74,730 short tons pilchards, 8,940 tons maasbanker, 153,095 tons mackerel, 169,635 tons anchovy, and 13,966 tons of red-eye herring. The total catch was 410,367 tons.

In the same period of 1966, the total catch was 314,317 tons: 115,166 tons pilchards, 21,955 tons maasbanker, 61,274 tons mackerel, 110,959 tons anchovy, and 4,963 tons of red-eye herring.

In 1965, the total catch was 381,855 tons: 222,291 tons pilchards, 42,096 tons maasbanker, 43,967 tons mackerel, 73,501 tons anchovy, and 100 tons of red-eye herring.

June Catch

According to figures of the Division of Sea Fisheries, the June catch comprised 3,612 tons pilchards and 35,392 tons anchovy. In June 1966, the catch was 6,401 tons pilchards, 8,498 tons maasbanker, 41 tons mackerel, 64,836 tons anchovy, and 60 tons of red-eye herring. In June 1965: 15,571 tons pilchards, 11,521 tons maasbanker, 40,889 tons anchovy.

The June 1967 catch yielded 8,864 short tons of fish meal, 270,076 imperial gallons of fish body oil, and 76,860 lbs. of canned pilchards.

In South-West Africa, the June shoal catch was 106,925 tons pilchards, 1,650 tons anchovy, and 100 tons maasbanker, yielding 26,928 tons of fish meal and 4,730 long tons of fish body oil. ("The South African Shipping News and Fishing Industry Review," Aug.)

South-West Africa

PILCHARD FISHING POOR

Pilchard fishing at Walvis Bay was very poor in July. The fish were erratic and had moved far north--almost to the Kunene River mouth. Some had moved 10 to 12 hours' steaming from port. When the fish arrived at the plant, most were not suitable for canning.

The 7 pilchard factories (6 with canning licenses) worked at reduced capacity. Towards the end of July, there were some signs of the fish moving south again.

Abnormal Weather

Although the fish are plentiful to the north, the fact that they are not to be found close to Walvis Bay is ascribed to weather conditions. The weather has been abnormal this year with an almost complete absence of southwest winds. The water temperatures off Walvis Bay have been unusually high, and more anchovy than usual have intruded from the north. ("The South African Shipping News and Fishing Industry Review," Aug.)

ARTICLES

NEW TESTS ASSESS QUALITY CHANGES IN FISH

By John Spinelli*

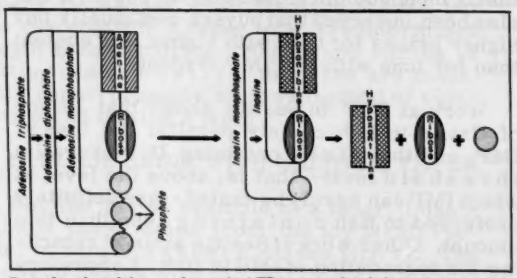
Any weekend fisherman knows that freshly caught fish has a flavor that is both subtle and attractive and that these desirable characteristics are gradually lost as the fish ages. Although the ability to describe and measure these changes in quality has eluded scientists, recent research is beginning to shed some light on them.

Because fish spoil rapidly, most people have associated flavor changes in fish with bacterial growth. So, for years, fresh and frozen fish were evaluated by sensory or objective tests based on the detection of the end products produced by growing bacteria. These tests have been useful but, because they failed to detect the more subtle changes in quality closely related to the acceptability of fish, they have never been considered adequate.

Recently, however, studies of certain biological changes that occur in fish post-mortem have resulted in important contributions to measuring the quality of fish and to understanding the chemical reactions that lead to the loss of quality. After a fish dies, a class of chemical compounds known as nucleotides is gradually broken down in the flesh into simpler chemical constituents. During iced storage, the nucleotides break down at a fairly rapid rate so that measurement of either the remaining nucleotides in the flesh, or their breakdown products, provides a basis to establish the time the fish has been held. Also, the degradation of nucleotides is involved in the changing flavor characteristics of the fish flesh.

The Key to Understanding the Degradation Process

The key to understanding this whole degradation process lies in a knowledge of the parent nucleotide known as adenosine triphosphate (ATP). ATP is a combination of two compounds, adenine and ribose, and of three phosphate molecules (figure). In living tissue, ATP provides the essential fuel for a whole series of life processes. In doing so, it is continually broken down and regenerated.



Complete breakdown of muscle ATP into its final degradation products--hypoxanthine, ribose, and phosphate.

After the death of the fish, it is no longer able to regenerate ATP, and ATP quickly goes through a sequence of reductions to the smaller molecules, adenosine diphosphate (ADP), adenosine monophosphate (AMP), and finally inosine monophosphate (IMP). IMP then slowly breaks down to inosine, and then to hypoxanthine, ribose, and phosphate--all as shown in figure.

The rates at which degradation occurs are different for different species of fish, so these rates must be determined experimentally to derive useful information from the measurement of nucleotides or their degradation products. For example, we have experimentally determined that Pacific ocean perch will lose about 50 percent of its IMP content after 5 days of iced storage and about 85 percent after 10 days of storage. Thus, an analysis of Pacific ocean perch for its remaining nucleotide content, or its hypoxanthine content, will yield a close approximation of the time it has been held in ice.

To date, scientists in the United States, Canada, Great Britain, and Japan have established the rates of nucleotide degradation for practically all commercially important species.

Relation of Nucleotides to Flavor

In addition to its use in developing a quality index, this work on nucleotides has given us

*Research Chemist, BCF Technological Laboratory, Seattle, Washington 98102.

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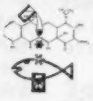
insight into the chemistry of the flavor of fish. Japanese workers established that IMP is not only a very flavorful compound, but that it enhances the flavors of other compounds. Its flavor-enhancing ability is far greater than that of monosodium glutamate. In Japan, it has also been observed that buyers continually pay higher prices for tuna with higher IMP content than for tuna with low IMP content.

Work at BCF in Seattle shows that losses of flavor in fish closely parallel the loss of IMP, and that fish containing IMP above its threshold level--that is, above the level at which IMP can barely be tasted--are definitely preferred to fish containing less than this amount. Other work at Seattle aims at retarding the degradation of IMP in fish. Laboratory trials show that superior flavor ratings are given to fish that have been treated to prevent the degradation of IMP over fish that have not been similarly treated.

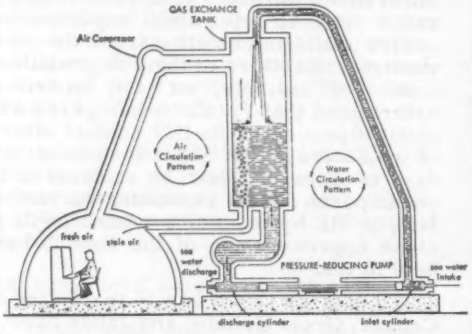
Future Testing of Fishery Products

The implications of these and other findings will undoubtedly influence the way in which commercial fishery products are tested. Today's methods readily distinguish between spoiled and not-so-spoiled fish. New methods will distinguish between fresh and not-so-fresh fish. Though once complicated, the procedures for determining nucleotides and their degradation products have evolved to the point where chemists can do them rapidly and with ease in modest, routine, quality-control laboratories. Through a combination of analytical techniques, a comprehensive quality profile will eventually emerge that will, with much greater accuracy, reflect the attitude of that final judge--the consumer.



AIR FROM THE SEA FOR OCEANAUTS

A system for pulling oxygen out of seawater to supply underwater dwellings indefinitely has been devised by Dr. Harold P. Vind at the U. S. Navy Civil Engineering Laboratory, Port Hueneme, Calif.



The pressure-reducing pump is particularly important, the Navy points out. An ordinary pump would have to be very powerful (and thus bulky) to discharge the water back into the ocean due to the pressure difference between the inside and the outside of the system. The new pump essentially uses the high pressure of the incoming water to push the used water through the discharge valve. Thus, the pump can run on little more power than that needed to overcome the friction of its components.

The inexpensive system uses basically a tank, some tubing and a pressure-reducing pump. In the system, oxygen-deficient stale air is forced into a gas-exchange tank where it meets a continuously circulating stream of seawater. The surfaces of the many droplets and bubbles act as diffusion membranes. The excess carbon dioxide in the stale air diffuses into the seawater, and the oxygen in the seawater diffuses into the air. The revitalized air is returned to the living chamber of the structure.

The Navy is studying the idea for both fixed shelters and undersea vehicles. (Reprinted, with permission from "Science News," weekly summary of current science, copyright 1966 by Science Service, Inc.)

A METHOD FOR TAPERING PURSE SEINES

By Jerry E. Jurkovich*

This paper describes how to compute tapers of netting to any predetermined length prior to cutting. Southeastern Alaska salmon purse seines, which are made up of horizontal strips of netting, and a Norwegian tuna seine, of vertical strips, are used as examples. The diagrams show how to cut netting with the least waste.

For the past 10 years, vessel owners in the salmon fishery in Puget Sound and southeastern Alaska have favored using wedged or tapered strips in one or both ends of their seines. The taper is inserted between strips of identical mesh size, and equal twine weight, and as near the corkline as possible. A tapered seine can be fished near shore without having a deep section of web dangling near the bottom. Deep gavels or breast lines have a tendency to foul the purse line, and a tapered strip reduces this tendency to a minimum. Although the need is obvious in seining for salmon, tapering of seines may be advantageous in other fisheries.

Purse seines are made up of either horizontal or vertical strips of webbing. In the United States, most purse seines, other than those used in the menhaden fishery, have horizontal strips of webbing; in northern Europe, purse seines have vertical strips.

Nearly all experienced fishermen can cut tapers or wedges when they are needed, but few can compute a taper to a predetermined length before cutting. Haphazard cutting of netting can be costly if mistakes are made. This report presents an easy method of computing and cutting a taper.

U. S. PURSE SEINE WITH UNIFORM TAPER

For the first example of a taper, I use a salmon purse seine from the Icy Strait district of southeastern Alaska (fig. 1). The bunt end begins with 225 MD (meshes deep) hung $11\frac{1}{2}$ to 12 fathoms in length to 10 fathoms of the corkline, which is the longest side because the leadline is usually 10 percent shorter than the corkline. At the completion of 10 fathoms of bunt, 25 more meshes of corkline selvage webbing are laced in. A taper starts at the junction between bunt and body between two adjacent strips of 4-inch stretch mesh.[1] This taper is to be 20 fathoms (hung measure) long, so allow 16.6 percent additional length for "hanging in" length (24 fathoms of web hung on 20 fathoms of corkline).

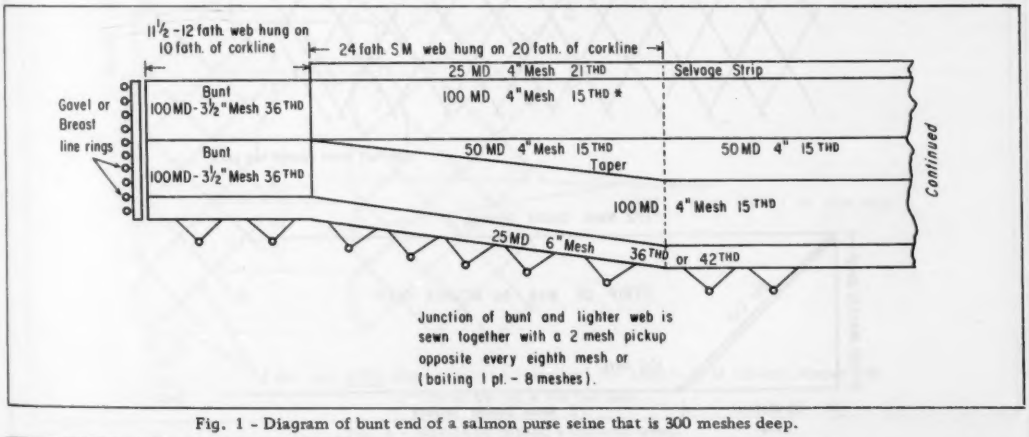

11½ - 12 fath. web hung on 10 fath. of corkline
24 fath. S M web hung on 20 fath. of corkline
25 MD 4" Mesh 21 THD
Selvage Strip
Gavel or Breast line rings
Bunt
100 MD - 3½" Mesh 36 THD
100 MD 4" Mesh 15 THD *
Bunt
100 MD - 3½" Mesh 36 THD
50 MD 4" Mesh 15 THD
Taper
50 MD 4" 15 THD
100 MD 4" Mesh 15 THD
25 MD 6" Mesh
36 THD or 42 THD
Continued
Junction of bunt and lighter web is sewn together with a 2 mesh pickup opposite every eighth mesh or (baiting 1 pt. - 8 meshes).

Fig. 1 - Diagram of bunt end of a salmon purse seine that is 300 meshes deep.

*Fishery Methods and Equipment Specialist, BCF's Exploratory Fishing and Gear Research Base, Seattle, Wash.

1/All mesh measurements in this paper are stretched mesh inside of one knot over and including opposite measured parallel to the selvage.

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Computing the Taper

First step: Draw a sketch of desired taper (fig. 2).

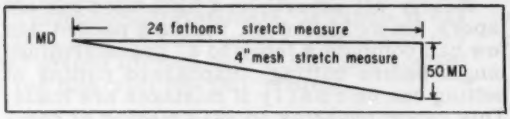

Fig. 2 - Sketch of desired taper.

Second step: Convert 24 fathoms SM (stretch measure) to number of meshes by dividing 1 fathom or 72 inches, by 4-inch mesh, to get 18 meshes per fathom; 24 fathoms x 18 = 432 ML (meshes long). The 432 meshes are rounded to the nearest 50, to get 450 ML.

Check a 1-fathom piece of webbing with a fathom stick, then count the meshes per fathom. This will prevent any mistakes caused by shrinkage or other variations quite often found in machine-made netting.

Third step: Set up a proportion $\frac{MD}{ML}$

$$\frac{MD}{ML} = \frac{50}{450} = \frac{1}{9}$$

The fraction (1/9) indicates a proportion of one mesh in vertical direction opposed to nine meshes in a longitudinal direction. Vertical direction can only be achieved through the use of bar cuts. Because two bars make one mesh, multiply the fraction (1/9) by 2 (see fig. 3).

$$\frac{2}{2} \times \frac{1}{9} = \frac{2}{18}$$

A netting fundamental is that two bars constitute one mesh. Therefore, all tapers must include two or four bars. Use of a two-bar

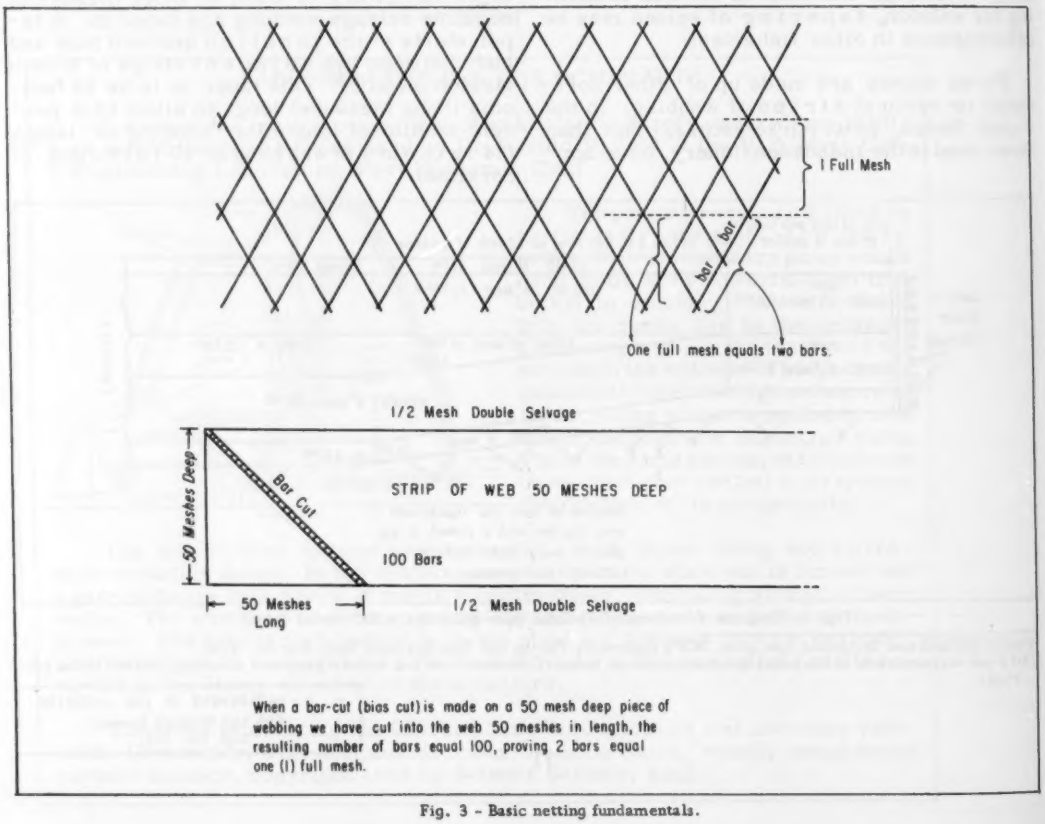
1 Full Mesh
bar
bar
One full mesh equals two bars.
1/2 Mesh Double Selvage
50 Meshes Deep
Bar Cut
STRIP OF WEB 50 MESHES DEEP
100 Bars
50 Meshes Long
1/2 Mesh Double Selvage
When a bar-cut (bias cut) is made on a 50 mesh deep piece of webbing we have cut into the web 50 meshes in length, the resulting number of bars equal 100, proving 2 bars equal one (1) full mesh.

Fig. 3 - Basic netting fundamentals.

formula is preferred for two reasons: (1) two bars reduce the chances of making mistakes; (2) four bars produce larger steps, resulting in a taper that is not quite so smooth. Either a two- or four-bar formula can be used with good results.

Substitute: $\frac{18 - 2}{2}$ = 8 meshes

The taper is two bars and eight meshes. Figure 4 reveals that in a two-bar, eight-mesh, taper the total number of legs cut is

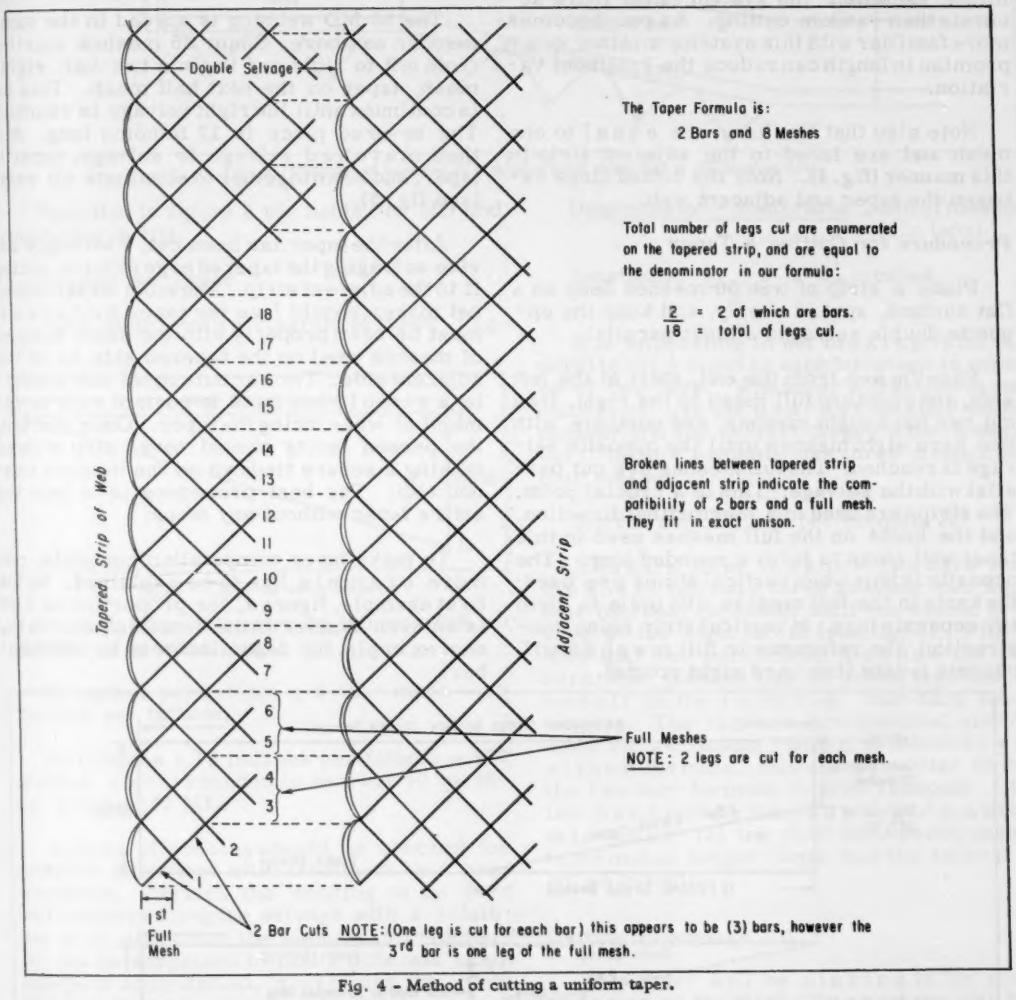
Double Selvage
Tapered Strip of Web
Adjacent Strip
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
1st Full Mesh
2 Bar Cuts
The Taper Formula is:
2 Bars and 8 Meshes
Total number of legs cut are enumerated on the tapered strip, and are equal to the denominator in our formula:
2 = 2 of which are bars.
18 = total of legs cut.
Broken lines between tapered strip and adjacent strip indicate the compatibility of 2 bars and a full mesh. They fit in exact unison.
Full Meshes
NOTE: 2 legs are cut for each mesh.
NOTE: (One leg is cut for each bar) this appears to be (3) bars, however the 3rd bar is one leg of the full mesh.

Fig. 4 - Method of cutting a uniform taper.

Result: Fraction 2/18--the numerator (2) indicates a cut of two bars. Next, compute the number of meshes in this taper:

$$\frac{\text{Denominator - Numerator}}{2} = \text{No. of meshes}$$

18, which is the denominator. The first two legs cut form bars, or numerator of the fraction 2/18. A cut of two bars eight meshes; two bars eight meshes; repeated until the opposite selvage side is reached will result in a taper about 24 fathoms long.

At this point, it is obvious that tapering is not precise; at best it is a compromise. The aforementioned taper was computed for 432 meshes long, then rounded to 450 meshes in length. The result is a taper that is 18 meshes, or 1 fathom, too long. Regardless of this minor variation, the system is far more accurate than random cutting. As one becomes more familiar with this system, a minor compromise in length can reduce the 1-fathom variation.

Note also that two bars are equal to one mesh and are laced to the adjacent strip in this manner (fig. 4). Note the dotted lines between the taper and adjacent web.

Procedure for Cutting A Taper

Place a strip of web 50 meshes deep on a flat surface, spread evenly, and keep the opposite double selvages almost parallel.

Face the web from the end, start at the left side, and count one full mesh to the right, then cut two bars eight meshes, and continue with two bars eight meshes until the opposite selvage is reached. The full meshes are cut parallel with the selvage. This is a crucial point. The strips are used in a longitudinal direction, and the knots on the full meshes used in this taper will clean to form a rounded loop. The opposite is true when vertical strips are used; the knots in the full meshes will untie to form two separate legs. In vertical strip seine construction, the reference to full meshes will become points (two bars eight points).

When a taper is cut in the aforementioned manner, the remains may be used at the opposite end of the seine.

An alternate method for better utilization of webbing should be used if a taper is needed only at one end of the seine.

The 50 MD webbing is spread in the same manner as above. Count 25 meshes starting from left to right and begin a two-bar, eight-mesh, taper on the next half mesh. This cut is continued until the right selvage is reached. The severed piece is 12 fathoms long. It is then matched selvage to selvage, taper to taper, and sewn together to eliminate all waste (see fig. 5).

After the taper has been cut, I strongly advise selvaging the tapered edge prior to lacing it to the adjacent strip. The most experienced net maker should lace the taper because it must be sewn properly with the same number of meshes used on the tapered side as on the adjacent side. Two bar cuts equal one mesh--is a simple but most important rule to remember when lacing the taper. Once started, the person lacing should never stop without making a secure tiedown so the meshes cannot slip. The best procedure is to lace the entire taper without any stops.

To make taper computation complete, one more example has to be explained. In the first example, figure 4, the proportion of 2/18 is an even number in the denominator. In the next example, the denominator is an odd number.

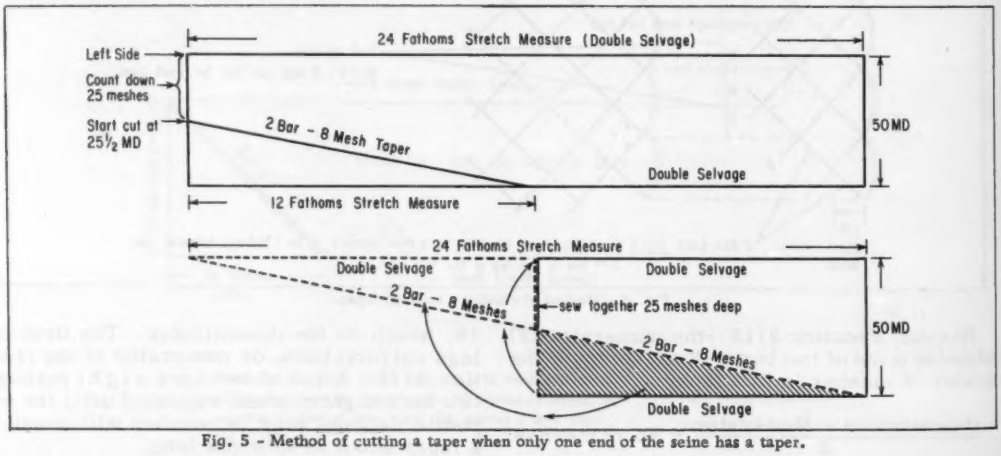

Fig. 5 - Method of cutting a taper when only one end of the seine has a taper.

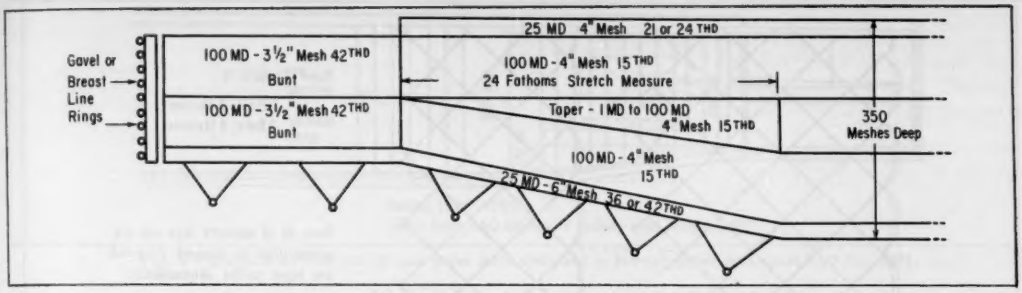
25 MD 4" Mesh 21 or 24 THD
Gavel or Breast Line Rings
100 MD - 3½" Mesh 42 THD Bunt
100 MD - 4" Mesh 15 THD
24 Fathoms Stretch Measure
100 MD - 3½" Mesh 42 THD Bunt
Taper - 1 MD to 100 MD 4" Mesh 15 THD
350 Meshes Deep
100 MD - 4" Mesh 15 THD
25 MD - 6" Mesh 36 or 42 THD

Fig. 6 - Diagram of bunt end of a salmon purse seine that is 350 meshes deep.

Note that in figure 6 the net is 350 MD and the taper is 100.

Computing the Taper

First step: Draw a diagram of taper (fig. 7).

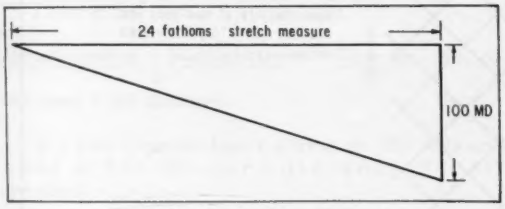

Fig. 7 - Sketch of desired taper.

Second step: Convert 24 fathoms SM to number of meshes long.

72 inches per fathom ÷ 4-inch mesh = 18 meshes per fathom.

24 fathoms x 18 meshes per fathom = 432 meshes which, rounded to nearest 50 meshes, will be 450 ML.

A piece of webbing should be checked for possible shrinkage after treatment by a preservative. Stretch the webbing to be used and measure along the selvage with a 1-fathom stick and count the meshes in 1 fathom. Do not be surprised to find a different count than your computation. Always use the count obtained from the measured length.

Third step: Proportion:

$$\frac{MD}{ML} = \frac{100\ (MD)}{450\ (ML)} = \frac{2}{9}$$

2 in the numerator = 2 bar cuts.

$$\frac{\text{Denominator} - \text{Numerator}}{2} = \text{No. of meshes in taper}$$

Substitute: $\frac{9 - 2}{2} = 3\frac{1}{2}$ meshes

It is impossible in net making (with tapers) to cut $\frac{1}{2}$ mesh as each full mesh is made up of two legs. Whenever a fraction is encountered, use the nearest smaller whole number and the nearest larger whole number. In this example use three meshes and four meshes.

Fourth step: The taper formula is:

Two bars three meshes; two bars four meshes; two bars three meshes; two bars four meshes; repeated, until the double selvage at the right is cut (see fig. 8). Please note that two bars three meshes and two bars four meshes can be added together to result in the formula: four bars seven meshes. The tapers are identical and the ultimate 24-fathom taper is achieved with either formula. However, I prefer to use the two-bar formula for two reasons: (1) two bars reduce the chances of making mistakes; (2) the four-bar, seven-mesh, taper makes larger steps, and the taper is not as smooth.

Cutting Procedure

This taper will be started in the same manner as the first. Spread the 100 MD webbing on a smooth flat surface, spread evenly, and keep opposite double selvages almost parallel. Count one full mesh (see fig. 8), then start two bars three meshes; two bars four meshes; two bars three meshes; two bars four meshes, alternating three and four meshes after each two bars. This will produce a 24-fathom taper from 1 to 100 MD.

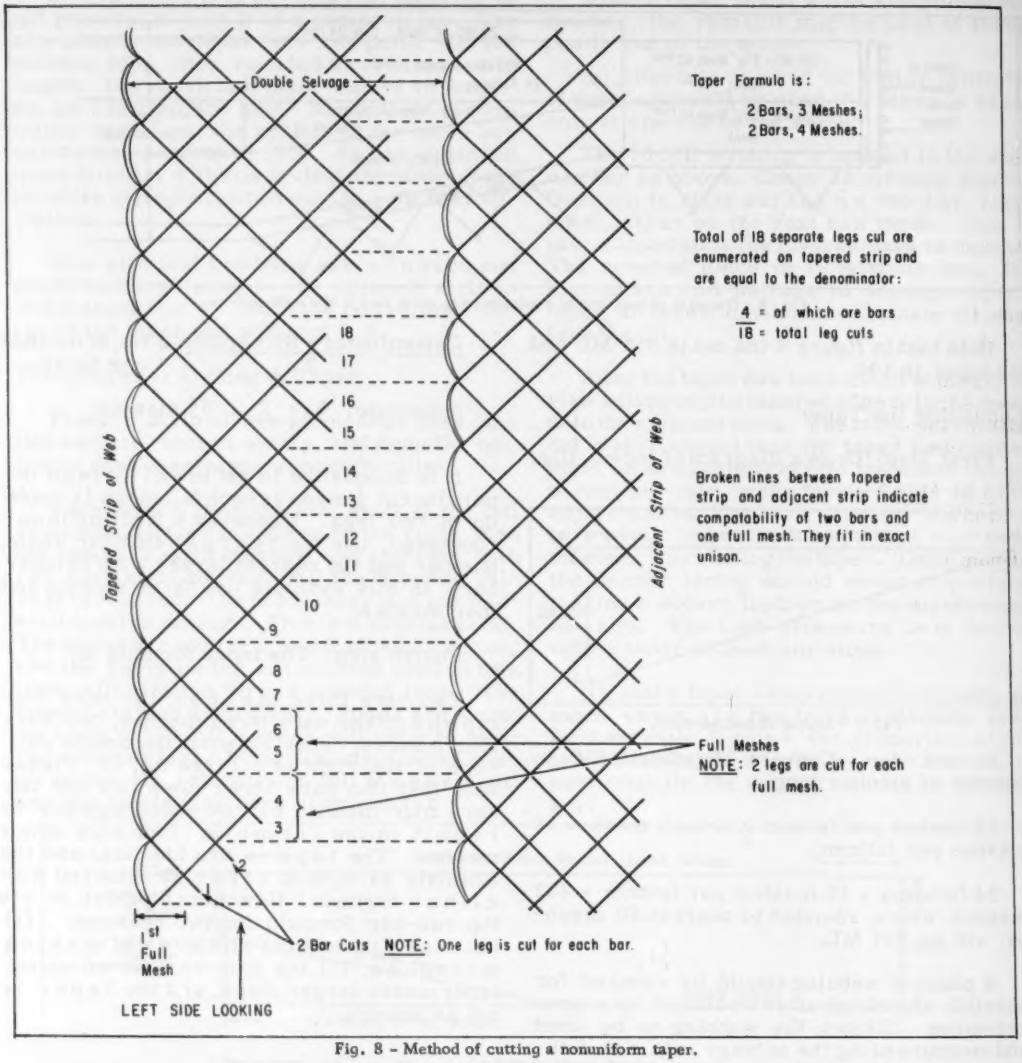

Fig. 8 - Method of cutting a nonuniform taper.

NORWEGIAN TUNA PURSE SEINE

The purse seine on data sheet FAO No. 305 (Food and Agriculture Organization, Catalogue of Fishing Gear Design, 1965) was selected for the example of a purse seine made up of vertical strips of webbing (fig. 9). The seams of vertical strips are laced together to make the selvages line up perfectly. This task is accomplished by using a baiting rate of 1 point 15 meshes to lace the long selvage to the short selvage so that they are the same length on the bottom edge. This baiting rate causes a bagging effect that is considered a good feature in purse seine configuration.

I believe that vertical strips laced mesh on mesh and a taper cut would work even more effectively because this seine has a 40 percent "hang in" initially, which gives plenty of bagging. Any additional bagging achieved by baiting is superfluous and will be a detriment, in-

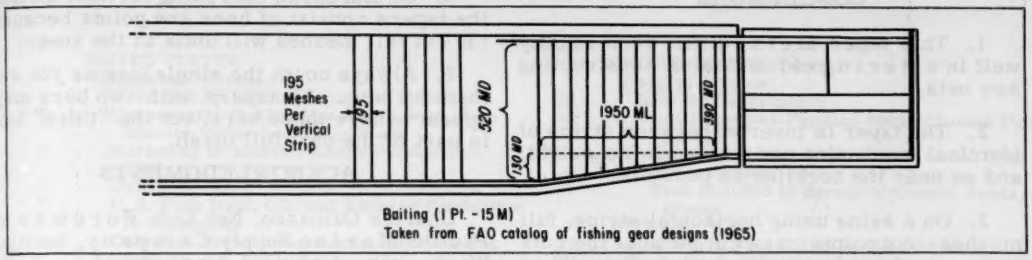

Fig. 9 - Diagram of bunt end of tuna purse seine designed in Norway (from data sheet FAO No. 305).

stead of an asset, when the seine is used where tides are strong.

From data sheet No. 305, the following is derived: 130 MD is the difference between 390 MD at the beginning of the taper and 520 MD at the completion of the taper.

$$\frac{130 \text{ MD}}{1950 \text{ ML}} = \frac{13}{195} = \frac{1 \times 2}{15 \times 2} = \frac{2}{30} = 2 \text{ bars}$$

$$\frac{\text{Denominator - Numerator}}{2} \qquad \frac{30 - 2}{2} = \text{No. of meshes} = 14 \text{ meshes.}$$

A 2 bar 14 point taper starts at 390 MD and ends at 520 MD over a distance of 1,950 meshes.

Panel I. Count down 403 meshes. At the next $\frac{1}{2}$ mesh, start cutting a 2-bar, 14-point, taper. Then match bottom and top on 403-mesh sides and lace together.

Panel II. Count down 429 meshes. At the next $\frac{1}{2}$ mesh, start cutting a 2-bar, 14-point taper and lace 429-mesh sides together. Then match 416-mesh sides from Panel I and II and lace together.

Panels III, IV, V--Repeat as in Panel I and II.

The result is a piece of netting with 390 MD gradually increasing to 520 MD over a span of 1,950 ML. The bottom edge is a con-

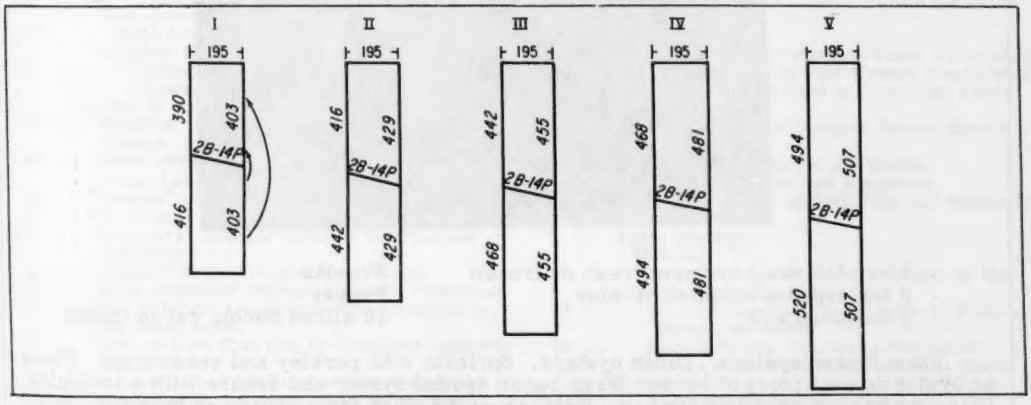

Fig. 10 - Method of cutting the webbing for FAO No. 305 with no waste.

Panel I - 195 ML x 806½ meshes deep
Panel II - 195 ML x 858½ " "
Panel III - 195 ML x 910½ " "
Panel IV - 195 ML x 962½ " "
Panel V - 195 ML x 1014½ " "

The half mesh is important because it is lost when the taper is cut.

tinuous 2-bar, 14-point, taper and the top seam has straight meshes.

The tapered edge at the bottom will lace mesh upon mesh to the selvage. When two bars are reached, they are treated exactly the same as one mesh. This will not be difficult.

CONCLUSIONS

1. This taper method will work equally well in altering old seines or constructing new nets.

2. The taper is inserted between strips of identical mesh size and equal twine weight, and as near the corkline as possible.

3. On a seine using horizontal strips, full meshes--not points--are cut because the cuts are made in a longitudinal direction. When the knots are cleaned, complete loops are formed.

4. On European nets using vertical strips, the tapers consist of bars and points because the cut full meshes will untie at the knot.

5. Always count the single legs as you cut them as bars. All tapers with two bars may appear to have three bars, but the "third" bar is part of the next full mesh.

ACKNOWLEDGMENTS

Charles Guinasso, Net Loft Foreman of Pacific Marine Supply Company, Seattle, Wash., gave technical assistance. A. K. Larssen, BCF, Juneau, Alaska, and R. L. McNeely, BCF, Seattle, Wash., made suggestions and comments.

ANGELS ON HORSEBACK

1 can (12 ozs.) oysters, fresh or frozen
2 tablespoons chopped parsley
½ teaspoon salt
Paprika
Pepper
10 slices bacon, cut in thirds

Thaw frozen oysters. Drain oysters. Sprinkle with parsley and seasonings. Place an oyster on each piece of bacon. Wrap bacon around oyster and secure with a toothpick. Place oysters on a broiler pan. Broil about 4 inches from source of heat for 8 to 10 minutes or until bacon is crisp. Turn carefully. Broil 4 to 5 minutes longer or until bacon is crisp. Makes approximately 30 hors d'oeuvres.

This idea for entertaining is from a new, 22-page, full-color booklet, "Nautical Notions for Nibbling, released by the United States Department of the Interior's BCF. It is available for 45¢ from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. Ask for Market Development Series No. 10, (catalog no. I-49.49/2:10).

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Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

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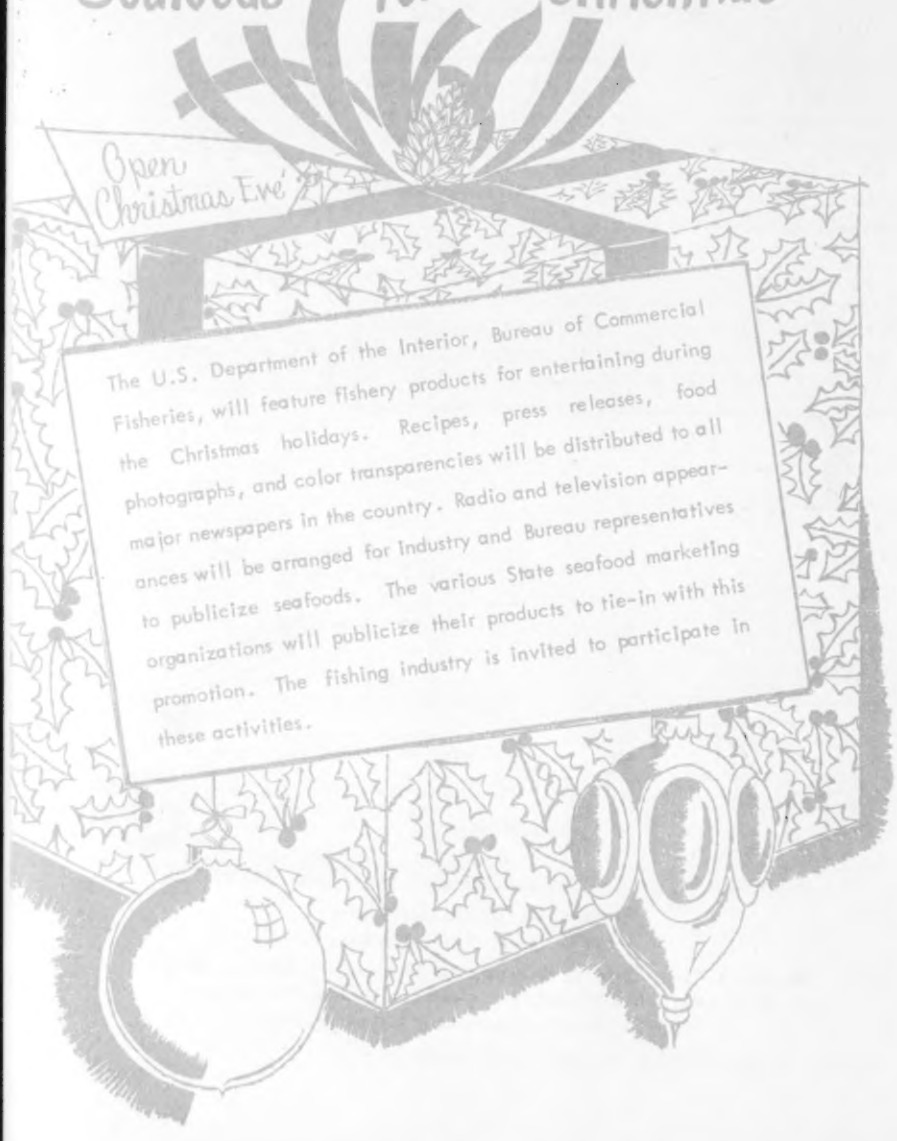
B. C. F. to Feature...

Seafoods For Christmas



The U.S. Department of the Interior, Bureau of Commercial Fisheries, will feature fishery products for entertaining during the Christmas holidays. Recipes, press releases, food photographs, and color transparencies will be distributed to all major newspapers in the country. Radio and television appearances will be arranged for Industry and Bureau representatives to publicize seafoods. The various State seafood marketing organizations will publicize their products to tie-in with this promotion. The fishing industry is invited to participate in these activities.